

CHAPTER 65
ANIMAL FEEDING OPERATIONS

[Prior to 7/1/83, DEQ Ch 20]

[Prior to 12/3/86, Water, Air and Waste Management[900]]

567—65.1(455B) Definitions. In addition to the definitions in Iowa Code sections 455B.101 and 455B.171 and Iowa Code section 455B.161, the following definitions shall apply to this chapter:

“*Adjacent*” means two or more animal feeding operations separated at their closest points by distances not greater than the following:

1. 1,250 feet for confinement feeding operations having an animal weight capacity of less than 1,250,000 pounds for animals other than bovine, or less than 4,000,000 pounds for bovine.

2. 1,500 feet for confinement feeding operations having an animal weight capacity of 1,250,000 or more pounds for animals other than bovine, but less than 2,000,000 pounds for animals other than animals kept in a swine farrow-to-finish operation or bovine kept in a confinement feeding operation, or less than 2,500,000 pounds for a swine farrow-to-finish operation, or 4,000,000 or more pounds but less than 6,000,000 pounds for bovine.

3. 2,500 feet for confinement feeding operations having an animal weight capacity of 2,000,000 or more pounds for animals other than animals kept in a swine farrow-to-finish operation or bovine kept in a confinement feeding operation; 2,500,000 or more pounds for a swine farrow-to-finish operation; or 6,000,000 or more pounds for bovine.

4. These distances shall only be used to determine that two or more animal feeding operations are adjacent if the animal feeding operation structure is constructed after March 20, 1996.

5. To determine if two or more animal feeding operations are adjacent, the animal weight capacity of each individual operation shall be used. If two or more animal feeding operations are not in the same animal weight capacity category, the greater animal weight capacity shall be used to determine the separation distance. The distance shall be measured from the closest points of the two animal feeding operations.

“*Aerobic structure*” means an animal feeding operation structure other than an egg washwater storage structure which employs bacterial action which is maintained by the utilization of air or oxygen and which includes aeration equipment.

“*Agricultural drainage well*” means a vertical opening to an aquifer or permeable substratum which is constructed by any means including but not limited to drilling, driving, digging, boring, augering, jetting, washing, or coring and which is capable of intercepting or receiving surface or subsurface drainage water from land directly or by a drainage system.

“*Agricultural drainage well area*” means an area of land where surface or subsurface water drains into an agricultural drainage well directly or through a drainage system connecting to the agricultural drainage well.

“*Anaerobic lagoon*” means an impoundment used in conjunction with an animal feeding operation, if the primary function of the impoundment is to store and stabilize organic wastes, the impoundment is designed to receive wastes on a regular basis, and the impoundment’s design waste loading rates provide that the predominant biological activity is anaerobic. An anaerobic lagoon does not include any of the following:

1. A confinement feeding operation structure.

2. A runoff control basin which collects and stores only precipitation-induced runoff from an animal feeding operation in which animals are confined to areas which are unroofed or partially roofed and in which no crop, vegetation, or forage growth or residue cover is maintained during the period in which animals are confined in the operation.

3. An anaerobic treatment system which includes collection and treatment facilities for all off gases.

“Animal” means a domesticated animal belonging to the bovine, porcine, ovine, caprine, equine, or avian species.

“Animal capacity” means the maximum number of animals which the owner or operator will confine in an animal feeding operation at any one time.

“Animal feeding operation” means a lot, yard, corral, building, or other area in which animals are confined and fed and maintained for 45 days or more in any 12-month period, and all structures used for the storage of manure from animals in the operation. An animal feeding operation does not include a livestock market.

1. For purposes of water quality regulation, Iowa Code section 455B.171 as amended by 1995 Iowa Acts, House File 519, provides that two or more animal feeding operations under common ownership or management are deemed to be a single animal feeding operation if they are adjacent or utilize a common area or system for manure disposal. For purposes of the separation distances in Iowa Code section 455B.162, Iowa Code section 455B.161 provides that two or more animal feeding operations under common ownership or management are deemed to be a single animal feeding operation if they are adjacent or utilize a common system for manure storage. The distinction is due to regulation of animal feeding operations for water quality purposes under the federal Clean Water Act. The Code of Federal Regulations at 40 CFR §122.23 (1995) sets out the requirements for an animal feeding operation and requires that two or more animal feeding operations under common ownership be considered a single operation if they adjoin each other or if they use a common area or system for manure disposal. However, this federal regulation does not control regulation of animal feeding operations for the purposes of the separation distances in Iowa Code section 455B.162, and therefore the definition is not required by federal law to include common areas for manure disposal.

2. To determine if two or more animal feeding operations are deemed to be one animal feeding operation, the first test is whether the animal feeding operations are under common ownership or management. If they are not under common ownership or management, they are not one animal feeding operation. For purposes of water quality regulation, the second test is whether the two animal feeding operations are adjacent or utilize a common area or system for manure disposal. If the two operations are not adjacent and do not use a common area or system for manure disposal, they are not one animal feeding operation. For purposes of the separation distances in Iowa Code section 455B.162, the second test is whether the two animal feeding operations are adjacent or utilize a common system for manure storage. If the two operations are not adjacent and do not use the same system for manure storage, they are not one animal feeding operation.

“Animal feeding operation structure” means an anaerobic lagoon, formed manure storage structure, egg washwater storage structure, earthen manure storage basin, or confinement building.

“Animal unit” means a unit of measurement used to determine the animal capacity of an animal feeding operation, based upon the product of multiplying the number of animals in each species by the following:

1. Slaughter and feeder cattle	1.0
2. Mature dairy cattle	1.4
3. Butcher and breeding swine, over 55 pounds	0.4
4. Swine between 15 and 55 pounds	0.1
5. Sheep or lambs	0.1
6. Horses	2.0
7. Turkeys	0.018
8. Broiler or layer chickens	0.01

“Animal weight capacity” for operations with only one species means the product of multiplying the maximum number of animals which the owner or operator confines in an animal feeding operation at any one time by the average weight during a production cycle. For operations with more than one species, the animal weight capacity is determined for each species and is then divided by the applicable construction permit requirement threshold for that species. The resulting figures for each species in the animal feeding operation should then be totaled, and if the total is not greater than 1.0 (100%), the applicable construction permit requirement threshold is not met and the operation would not need a construction permit.

EXAMPLE 1. Bill wants to construct an animal feeding operation with two confinement buildings and an earthen manure storage basin. The capacity of each building will be 900 market hogs. The hogs enter the building at 40 pounds and leave at 250 pounds. The average weight during the production cycle is then 145 pounds for that animal feeding operation. The animal weight capacity of the operation is 145 pounds multiplied by 1800 for a total of 261,000 pounds.

EXAMPLE 2. Howard is planning to build an animal feeding operation with eight confinement buildings and an egg washwater lagoon. The capacity of each building will be 125,000 laying hens. The hens enter the building at around 2.5 pounds and leave at around 3.5 pounds. The average weight during the production cycle for these laying hens is 3.0 pounds. The animal weight capacity of the operation is 3.0 pounds multiplied by 1,000,000 for a total of 3,000,000 pounds.

EXAMPLE 3. Carol has an animal feeding operation with four confinement buildings and one open feedlot. One confinement building is a farrowing building with a capacity of 72 sows. One confinement building is a nursery building with a capacity of 1,450 pigs. The open feedlot contains 425 sows. Two of the confinement buildings are finishing buildings with a capacity of 1,250 market hogs. The farrowing building contains 72 sows at an average weight of 400 pounds for an animal weight capacity of 28,800 pounds. The nursery building contains 1,450 pigs with an average weight over the production cycle of 25 pounds for an animal weight capacity of 36,250 pounds. The finishing building contains 2,500 market hogs with an average weight over the production cycle of 150 pounds for an animal weight capacity of 375,000 pounds. The open feedlot contains 425 sows with an average weight of 400 pounds for an animal weight capacity of 170,000 pounds. The confinement feeding operation has an animal weight capacity of 440,050 pounds. The open feedlot has an animal weight capacity of 170,000 pounds.

“Applicant” means the person applying for a construction or operation permit for an animal feeding operation. The applicant shall be the owner or owners of the animal feeding operation.

“Commercial enterprise” means a building which is used as a part of a business that manufactures goods, delivers services, or sells goods or services, which is customarily and regularly used by the general public during the entire calendar year and which is connected to electric, water, and sewer systems. A commercial enterprise does not include a farm operation.

“Common management” means significant control by a person of the management of the day-to-day operations of each of two or more animal feeding operations.

“Common ownership” means the ownership of an animal feeding operation as a sole proprietor, or a majority ownership interest held by a person, in each of two or more animal feeding operations as a joint tenant, tenant in common, shareholder, partner, member, beneficiary, or other equity interest holder. The majority ownership interest is a common ownership interest when it is held directly, indirectly through a spouse or dependent child, or both.

“Confinement building” means a building used in conjunction with a confinement feeding operation to house animals.

“Confinement feeding operation” means an animal feeding operation in which animals are confined to areas which are totally roofed.

“Confinement feeding operation structure” means a formed manure storage structure, egg wash-water storage structure, earthen manure storage basin, or confinement building. A confinement feeding operation structure does not include an anaerobic lagoon.

“Construction permit” means a written approval of the department to construct an animal feeding operation structure.

“Controlling interest” means ownership of a confinement feeding operation as a sole proprietor or a majority ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary, or other equity interest holder. The majority ownership interest is a controlling interest when it is held directly, indirectly through a spouse or dependent child, or both. The majority ownership interest must be a voting interest or otherwise control management of the confinement feeding operation.

“Covered” means organic or inorganic material, placed upon an animal feeding operation structure used to store manure, which significantly reduces the exchange of gases between the stored manure and the outside air. Organic materials include, but are not limited to, a layer of chopped straw, other crop residue, or a naturally occurring crust on the surface of the stored manure. Inorganic materials include, but are not limited to, wood, steel, aluminum, rubber, plastic, or Styrofoam. The materials shall shield at least 90 percent of the surface area of the stored manure from the outside air. Covered shall include an organic or inorganic material which current scientific research shows reduces detectable odor by at least 75 percent. A formed manure storage structure directly beneath a floor where animals are housed in a confinement feeding operation is deemed to be covered.

“Cropland” means any land suitable for use in agricultural production including, but not limited to, feed, grain and seed crops, fruits, vegetables, forages, sod, trees, grassland, pasture and other similar crops.

“Deep well” means a well located and constructed in such a manner that there is a continuous layer of low permeability soil or rock at least 5 feet thick located at least 25 feet below the normal ground surface and above the aquifer from which water is to be drawn.

“Designated area” means a known sinkhole, or a cistern, abandoned well, unplugged agricultural drainage well, agricultural drainage well surface tile inlet, drinking water well, lake, or a farm pond or privately owned lake as defined in Iowa Code section 462A.2. A designated area does not include a terrace tile inlet or surface tile inlet other than an agricultural drainage well surface tile inlet.

“Discontinued animal feeding operation” means an animal feeding operation whose use has been discontinued and the owner or operator does not intend to resume its use for a period of 12 months or more.

“Earthen manure storage basin” means an earthen cavity, either covered or uncovered, which, on a regular basis, receives manure discharges from a confinement feeding operation if accumulated manure from the basin is completely removed at least once each year.

“Earthen waste slurry storage basin” means an uncovered and exclusively earthen cavity which, on a regular basis, receives manure discharges from a confinement animal feeding operation if accumulated manure from the basin is completely removed at least twice each year and which was issued a permit, constructed or expanded on or after July 1, 1990, but prior to May 31, 1995.

“Educational institution” means a building in which an organized course of study or training is offered to students enrolled in kindergarten through grade 12 and served by local school districts, accredited or approved nonpublic schools, area educational agencies, community colleges, institutions of higher education under the control of the state board of regents, and accredited independent colleges and universities.

“Egg washwater storage structure” means an aerobic or anaerobic structure used to store the wastewater resulting from the washing and in-shell packaging of eggs. It does not include a structure also used as a manure storage structure.

“Enforcement action” means an action against a confinement feeding operation initiated by the department or the attorney general to enforce the provisions of Iowa Code chapter 455B or rules adopted pursuant to the chapter. An enforcement action begins when the department issues an administrative order to the person, when the department notifies a person in writing of intent to recommend referral or the commission refers the action to the attorney general pursuant to Iowa Code section 455B.141 or 455B.191, or when the attorney general institutes proceedings pursuant to section 455B.112, whichever occurs first. An enforcement action is pending until final resolution of the action by satisfaction of an administrative order; rescission or other final resolution of an administrative order or satisfaction of a court order, for which all administrative and judicial appeal rights are exhausted, expired, or waived.

“Formed manure storage structure” means a structure, either covered or uncovered, used to store manure from a confinement feeding operation, which has walls and a floor constructed of concrete, concrete block, wood, steel, or similar materials. Similar materials may include, but are not limited to, plastic, rubber, fiberglass, or other synthetic materials. Materials used in a formed manure storage structure shall have the structural integrity to withstand expected internal and external load pressures.

“Freeboard” means the difference in elevation between the liquid level and the top of the lowest point of animal feeding operation structure’s berm or the lowest external outlet from a formed manure storage structure.

“Highly erodible land” means a field that has one-third or more of its acres or 50 acres, whichever is less, with soils that have an erodibility index of eight or more, as determined by rules promulgated by the United States Department of Agriculture.

“Indemnity fund” means the manure storage indemnity fund created in Iowa Code section 204.2.

“Interest” means ownership of a confinement feeding operation as a sole proprietor or a 10 percent or more ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary, or other equity interest holder. The ownership interest is an interest when it is held directly, indirectly through a spouse or dependent child, or both.

“Livestock market” means any place where animals are assembled from two or more sources for public auction, private sale, or on a commission basis, which is under state or federal supervision, including a livestock sale barn or auction market, if such animals are kept for ten days or less.

“Man-made manure drainage system” means a drainage ditch, flushing system, or other drainage device which was constructed by man and is used for the purpose of transporting manure.

“Manure” means animal excreta or other commonly associated wastes of animals including, but not limited to, bedding, litter, or feed losses. Manure does not include wastewater resulting from the washing and in-shell packaging of eggs.

“Manure storage structure” means an aerobic structure, anaerobic lagoon, earthen manure storage basin, or formed manure storage structure. Manure storage structure does not include an egg washwater storage structure.

“New animal feeding operation” means an animal feeding operation whose construction was begun after July 22, 1987, or whose operation is resumed after having been discontinued for a period of 12 months or more.

“Nonpublic water supply” means a water system that has fewer than 15 service connections or serves fewer than 25 people, or one that has more than 15 service connections or serves more than 25 people for less than 60 days a year.

“Open feedlot” means an unroofed or partially roofed animal feeding operation in which no crop, vegetation, or forage growth or residue cover is maintained during the period that animals are confined in the operation.

“Operation permit” means a written permit of the department authorizing the operation of a manure control facility or part of one.

“Permanent vegetation cover” means land which is maintained in perennial vegetative cover consisting of grasses, legumes, or both, and includes, but is not limited to, pastures, grasslands or forages.

“Public use area” means that portion of land owned by the United States, the state, or a political subdivision with facilities which attract the public to congregate and remain in the area for significant periods of time. Facilities include, but are not limited to, picnic grounds, campgrounds, lodges, shelter houses, playground equipment, lakes as listed in Table 2 at the end of this chapter, and swimming beaches. It does not include a highway, road right-of-way, cemetery, parking areas, recreational trails or other areas where the public passes through, but does not congregate or remain in the area for significant periods of time.

“Public water supply” (also referred to as a system or a water system) means a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the supplier of water and used primarily in connection with such system, and (2) any collection (including wells) or pretreatment storage facilities not under such control which are used primarily in connection with such system. A public water supply system is either a “community water system” or a “noncommunity water system.”

“Religious institution” means a building in which an active congregation is devoted to worship.

“Residence” means a house or other building, including all structures attached to the building, not owned by the owner of the animal feeding operation, which is used as a place of habitation for humans on a permanent and frequent basis. In the absence of evidence to the contrary, a house or building that has not been occupied by humans for more than six months in the last two years is presumed not to be a residence. A residence must exist at the time an applicant submits an application for a construction permit to the department or at the time construction of the animal feeding operation structure begins if a construction permit is not required.

“Runoff control basin” means an impoundment designed and operated to collect and store runoff from an open feedlot.

“Shallow well” means a well located and constructed in such a manner that there is not a continuous layer of low permeability soil or rock (or equivalent retarding mechanism acceptable to the department) at least 5 feet thick, the top of which is located at least 25 feet below the normal ground surface and above the aquifer from which water is to be drawn.

“Small animal feeding operation” means an animal feeding operation which has an animal weight capacity of 200,000 pounds or less for animals other than bovine, or 400,000 pounds or less for bovine.

“Solids settling facility” means a basin, terrace, diversion, or other structure which is designed and operated to remove settleable solids from open feedlot runoff.

“Spray irrigation equipment” means mechanical equipment used for the aerial application of manure which receives manure from the storage structure during application via hoses or piping and which is a type of equipment which may also be customarily used for artificial application of water to aid the growing of general farm crops.

“Swine farrow-to-finish operation” means a confinement feeding operation in which porcine are produced and in which a primary portion of the phases of the production cycle are conducted at one confinement feeding operation. Phases of the production cycle include, but are not limited to, gestation, farrowing, growing and finishing. At a minimum, farrowing, growing, and finishing shall be conducted.

“Wetted perimeter” means the outside edge of land where the direct discharge of manure occurs from spray irrigation equipment.

567—65.2(455B) Minimum manure control requirements and guidelines. Water pollution control facilities shall be constructed and maintained to meet the minimum manure control requirements stated in subrules 65.2(1) to 65.2(10) of this rule. Subrule 65.2(11) of this rule provides guidelines in addition to these requirements.

65.2(1) The minimum level of manure control for any animal feeding operation shall be the removal of settleable solids from the manure prior to discharge into a water of the state.

a. Settleable solids may be removed by use of solids-settling basins, terraces, diversions, or other solid-removal methods. Construction of solids-settling facilities shall not be required where existing site conditions provide adequate settleable solids removal.

b. Removal of settleable manure solids shall be considered adequate when the velocity of manure flows has been reduced to less than 0.5 foot per second for a minimum of five minutes. Sufficient capacity shall be provided in the solids-settling facilities to store settled solids between periods of manure application and to provide required flow-velocity reduction for manure flow volumes resulting from precipitation events of less intensity than the ten-year, one-hour frequency event. Solids-settling facilities receiving open feedlot runoff shall provide a minimum of 1 square foot of surface area for each 8 cubic feet of runoff per hour resulting from the ten-year, one-hour frequency-precipitation event.

65.2(2) The minimum level of manure control for an open feedlot covered by the operation-permit application requirements of 65.3(1) or 65.3(2) shall be retention of all manure flows from the feedlot areas and all other manure-contributing areas resulting from the 25-year, 24-hour precipitation event. Open feedlots which design, construct, and operate waste control facilities in accordance with the requirements of any of the manure control alternatives listed in Appendix A of these rules shall be considered to be in compliance with this rule, unless discharges from the manure control facility cause a violation of state water quality standards. If water quality standards violations occur, the department may impose additional manure control requirements upon the feedlot, as specified in subrule 65.2(4).

Control of manure from open feedlots may be accomplished through use of manure-retention basins, terraces, or other runoff control methods. Diversion of uncontaminated surface drainage prior to contact with feedlot or manure-storage areas may be required. Manure-solids-settling facilities shall precede the manure-retention basins or terraces.

65.2(3) The minimum level of manure control for a confinement feeding operation shall be the retention of all manure produced in the confinement enclosures between periods of manure application. In no case shall manure from a confinement feeding operation be discharged directly into a water of the state or into a tile line that discharges to waters of the state. A confinement feeding operation that is required to submit a manure management plan to the department under rule 65.16(455B) or 65.18(455B) shall not apply manure in excess of the nitrogen use levels necessary to obtain optimum crop yields.

a. Control of manure from confinement feeding operations may be accomplished through use of manure storage structures or other manure control methods. Sufficient capacity shall be provided in the manure storage structure to store all manure between periods of manure application. Additional capacity shall be provided if precipitation, manure or wastes from other sources can enter the manure storage structure.

b. Manure shall be removed from the control facilities as necessary to prevent overflow or discharge of manure from the facilities. Manure stored in earthen manure storage structures (anaerobic lagoons, earthen manure storage basins, or earthen waste slurry storage basins) shall be removed from the structures as necessary to maintain a minimum of two feet of freeboard in the structure, unless a greater level of freeboard is required to maintain the structural integrity of the structure or prevent manure overflow. Manure stored in unroofed formed manure storage structures shall be removed from the structures as necessary to maintain a minimum of one foot of freeboard in the structure unless a greater level of freeboard is required to maintain the structural integrity of the structure or prevent manure overflow.

c. To ensure that adequate capacity exists in the manure storage structure to retain all manure produced during periods when manure application cannot be conducted (due to inclement weather conditions, lack of available land disposal areas, or other factors), the manure shall be removed from the manure storage structure as needed prior to these periods.

65.2(4) If site topography, operation procedures, experience, or other factors indicate that a greater or lesser level of manure control than that specified in subrule 65.2(1), 65.2(2), or 65.2(3) is required to provide an adequate level of water pollution control for a specific animal feeding operation, the department may establish different minimum manure control requirements for that operation.

65.2(5) In lieu of using the manure control methods specified in subrule 65.2(1), 65.2(2), or 65.2(3), the department may allow the use of manure treatment or other methods of manure control if it determines that an adequate level of manure control will result.

65.2(6) No direct discharge shall be allowed from an animal feeding operation into a publicly owned lake, a sinkhole, or an agricultural drainage well.

65.2(7) All manure removed from an animal feeding operation or its manure control facilities shall be land applied in a manner which will not cause surface or groundwater pollution. Application in accordance with the provisions of state law, and the rules and guidelines in this chapter, shall be deemed as compliance with this requirement.

65.2(8) As soon as practical but not later than six months after the use of an animal feeding operation is discontinued, all manure shall be removed from the discontinued animal feeding operation and its manure control facilities and be land applied.

65.2(9) A person shall not apply manure on cropland within 200 feet from a designated area, unless one of the following applies:

- a. The manure is applied by injection or incorporation within 24 hours following application.
- b. An area of permanent vegetation cover exists for 50 feet surrounding the designated area and that area is not subject to manure application.

65.2(10) A person shall not apply manure by spray irrigation equipment, except as provided in the following paragraphs.

a. *Minimum manure control.* Manure shall be applied by spray irrigation equipment from an animal feeding operation in a manner which will not cause surface water or groundwater pollution. Application in accordance with the provisions of state law, and the rules and guidelines in this chapter, shall be deemed as compliance with this requirement.

b. *Application rate.* The spray irrigation equipment shall be operated in a manner and with an application rate and timing that does not cause runoff of the manure onto the property adjoining the property where the spray irrigation equipment is being operated.

c. *Separation distance from property line.* Spray irrigation equipment shall be set up to provide for a minimum distance of 100 feet between the wetted perimeter as specified in the spray irrigation equipment manufacturer's specifications and the boundary line of the property where the equipment is being operated. The actual wetted perimeter, as determined by wind speed and direction and other operating conditions, shall not exceed the boundary line of the property where the equipment is being operated. For property which includes a road right-of-way, railroad right-of-way or an access easement, the property boundary line shall be the boundary line of the right-of-way or easement.

d. *Separation distance from structures.*

(1) A separation distance shall apply for application of manure by spray irrigation equipment between the manufacturer's specification for the wetted perimeter and the closest point of a residence, commercial enterprise, bona fide religious institution, educational institution or public use area, as follows:

1. For manure from an earthen waste slurry storage basin, earthen manure storage basin, or formed manure storage structure, the minimum separation distance shall be 1,000 feet.

2. For manure from the first or second cells of an anaerobic lagoon, the minimum separation distance shall be 750 feet.

3. For manure from the third cell of an anaerobic lagoon or a runoff control basin, the minimum separation distance shall be 500 feet.

4. For manure from an aerobic structure, the separation distance shall be 100 feet.

(2) If the manure in 65.2(10) "d"(1)"1" and "2" is incorporated into the soil within 24 hours following completion of application, the minimum separation distance shall be 500 feet between the manufacturer's specification for the wetted perimeter and the closest point of a residence, a commercial enterprise, bona fide religious institution, educational institution or public use area.

(3) If the manure in 65.2(10) "d"(1)"1" and "2" is applied near the residence, commercial enterprise, bona fide religious institution, educational institution or public use area from which separation is required, once per calendar year for a period of less than four days during a consecutive seven-day period, the minimum separation distance shall be 500 feet between the manufacturer's specification for the wetted perimeter and the closest point of a residence, a commercial enterprise, bona fide religious institution, educational institution or public use area.

(4) A separation distance requirement in this subrule for the spray irrigation of manure does not apply if the residence, educational institution, commercial enterprise, or bona fide religious institution was constructed, or if the public use area was established or the public use area boundaries were expanded, after the date that the animal feeding operation began using spray irrigation equipment as a method for manure application on the cropland subject to a separation distance in 65.2(10) "d"(1).

(5) Spray irrigation equipment with a center pivot system using hoses which discharge the manure at a maximum height of 9 feet and in a downward direction, and spray nozzles with a pressure of 25 pounds per square inch or less shall have a minimum separation distance of 250 feet between the manufacturer's specification for the wetted perimeter and the closest point of a residence, a commercial enterprise, bona fide religious institution, educational institution or public use area.

e. *Written waiver from minimum separation distances.* A separation distance requirement in this subrule for spray irrigation of manure does not apply if a written waiver is executed by the property owner benefiting from the separation distance. The written waiver becomes effective only upon the recording of the waiver in the office of the recorder of deeds of the county in which the benefited land is located. The filed waiver shall preclude enforcement of the separation distance requirement for spray irrigation of manure that is waived.

f. Variances. Variances to this subrule may be granted by the department if sufficient and proposed alternative information is provided to substantiate the need and propriety for such action. Variances may be granted on a temporary or permanent basis. The request for a variance shall be in writing and include information regarding:

(1) The type of manure storage structure from which the manure will be applied by spray irrigation equipment.

(2) The spray irrigation equipment to be used in the application of manure.

(3) Other information as the department may request.

g. Agricultural drainage wells. Manure shall not be applied by spray irrigation equipment on land located within an agricultural drainage well area.

65.2(11) Except as required by rule in this chapter, the following practices are recommended:

a. Nitrogen application rates. To minimize the potential for leaching to groundwater or runoff to surface waters, nitrogen application from all sources, including manure, legumes, and commercial fertilizers, should not be in excess of the nitrogen use levels necessary to obtain optimum crop yields for the crop being grown.

b. Phosphorous application rates. To minimize phosphorous movement to surface waters, manure should be applied at rates equivalent to crop uptake when soil tests indicate adequate phosphorous levels. Phosphorous application more than crop removal can be used to obtain maximum crop production when soil tests indicate very low or low phosphorous levels.

c. Manure application on frozen or snow-covered cropland. Manure application on frozen or snow-covered cropland should be avoided where possible. If manure is spread on frozen or snow-covered cropland, application should be limited to areas on which:

(1) Land slopes are 4 percent or less, or

(2) Adequate erosion control practices exist. Adequate erosion control practices may include such practices as terraces, conservation tillage, cover crops, contour farming or similar practices.

d. Manure application on cropland subject to flooding. Manure application on cropland subject to flooding more than once every ten years should be incorporated into the soil after application. Manure should not be spread on such areas during frozen or snow-covered conditions.

e. Manure application on land adjacent to water bodies. Unless adequate erosion controls exist on the land and manure is injected or incorporated into the soil, manure application should not be done on land areas located within 200 feet of and draining into a stream or surface intake for a tile line or other buried conduit. No manure should be spread on waterways except for the purpose of establishing seedings.

f. Manure application on steeply sloping cropland. Manure application on tilled cropland with greater than 10 percent slopes should be limited to areas where adequate soil erosion control practices exist. Injection or soil incorporation of manure is recommended where consistent with the established soil erosion control practices.

567—65.3(455B) Operation permit required. An animal feeding operation shall apply for and obtain an operation permit if any of the following conditions exist:

65.3(1) The capacity of an open feedlot exceeds any of the following:

a. 1,000 beef cattle

b. 700 dairy cattle

c. 2,500 butcher and breeding swine (over 55 lbs.)

d. 10,000 sheep or lambs

e. 55,000 turkeys

f. 500 horses

g. 1,000 animal units

65.3(2) Manure from the operation is discharged into a water of the state through a man-made manure drainage system or is discharged directly into a water of the state which originates outside of and traverses the operation, and the capacity of the operation exceeds:

- a. 300 beef cattle
- b. 200 dairy cattle
- c. 750 butcher and breeding swine (over 55 lbs.)
- d. 3,000 sheep or lambs
- e. 16,500 turkeys
- f. 30,000 broiler or layer chickens
- g. 150 horses
- h. 300 animal units

65.3(3) The department notifies the operation in writing that, in accordance with the departmental evaluation provisions of 65.4(2) "a," application for an operation permit is required.

567—65.4(455B) Departmental evaluation.

65.4(1) The department may evaluate any animal feeding operation to determine if any of the following conditions exist:

- a. Manure from the operation is being discharged into a water of the state and the operation is not providing the applicable minimum level of manure control as specified in subrule 65.2(1), 65.2(2), or 65.2(3);
- b. Manure from the operation is causing or may reasonably be expected to cause pollution of a water of the state; or
- c. Manure from the operation is causing or may reasonably be expected to cause a violation of state water quality standards.

65.4(2) If departmental evaluation determines that any of the conditions listed in subrule 65.4(1) exist, the operation shall:

- a. Apply for an operation permit if the operation receives a written notification from the department that it is required to apply for an operation permit. However, no operation with an animal capacity less than that specified in subrule 65.3(2) shall be required to apply for a permit unless manure from the operation is discharged into a water of the state through a man-made manure drainage system or is discharged into a water of the state which traverses the operation.
- b. Institute necessary remedial actions to eliminate the conditions if the operation receives a written notification from the department of the need to correct the conditions. This paragraph shall apply to all permitted and unpermitted animal feeding operations, regardless of animal capacity.

567—65.5(455B) Operation permits.

65.5(1) *Existing animal feeding operations holding an operation permit.* Animal feeding operations which hold a valid operation permit issued prior to July 22, 1987, are not required to reapply for an operation permit. However, the operations are required to apply for permit renewal in accordance with subrule 65.5(10).

65.5(2) *Existing animal feeding operations not holding an operation permit.* Animal feeding operations in existence on July 22, 1987, which are covered by the operation-permit provisions of subrule 65.3(1) or 65.3(2) but have not obtained a permit, shall apply for an operation permit prior to January 22, 1988. Once application has been made, the animal feeding operation is authorized to continue to operate without an operation permit until the application has either been approved or disapproved by the department.

65.5(3) Expansion of existing animal feeding operations. A person intending to expand an existing animal feeding operation which, upon completion of the expansion, will be covered by the operation-permit provisions of subrule 65.3(1) or 65.3(2) shall apply for an operation permit at least 180 days prior to the date operation of the expanded facility is scheduled. Operation of the expanded portion of the facility shall not begin until an operation permit has been obtained.

65.5(4) New animal feeding operations. A person intending to begin a new animal feeding operation which, upon completion, will be covered by the operation-permit provisions of subrule 65.3(1) or 65.3(2) shall apply for an operation permit at least 180 days prior to the date operation of the new animal feeding facility is scheduled. Operation of the new facility shall not begin until an operation permit has been obtained.

65.5(5) Permits required as a result of departmental evaluation. An animal feeding operation which is required to apply for an operation permit as a result of departmental evaluation (in accordance with the provisions of 65.4(2)“a”) shall apply for an operation permit within 90 days of receiving written notification of the need to obtain a permit. Once application has been made, the animal feeding operation is authorized to continue to operate without a permit until the application has either been approved or disapproved by the department.

65.5(6) Voluntary operation permit applications. Applications for operation permits received from animal feeding operations not meeting the operation-permit requirements of subrules 65.3(1) to 65.3(3) will be acknowledged by the department and returned to the applicant. Operation permits will not be issued for facilities not meeting the permit requirements of subrules 65.3(1) to 65.3(3).

65.5(7) Application forms. An application for an operation permit shall be made on a form provided by the department. The application shall be complete and shall contain detailed information as deemed necessary by the department. The application shall be signed by the person who is legally responsible for the animal feeding operation and its associated manure control system.

65.5(8) Compliance schedule. When necessary to comply with a present standard or a standard which must be met at a future date, an operation permit shall include a schedule for modification of the permitted facility to meet the standard. The schedule shall not relieve the permittee of the duty to obtain a construction permit pursuant to subrule 65.6(1).

65.5(9) Permit conditions. Operation permits shall contain conditions considered necessary by the department to ensure compliance with all applicable rules of the department, to ensure that the manure-control system is properly operated and maintained, to protect the public health and beneficial uses of state waters, and to prevent water pollution from manure storage or application operations. Self-monitoring and reporting requirements which may be imposed on animal feeding operations are specified in 567—subrule 63.5(1).

65.5(10) Permit renewal. An operation permit may be issued for any period of time not to exceed five years. An application for renewal of an operation permit must be submitted to the department at least 180 days prior to the date the permit expires. Each permit to be renewed shall be subject to the provisions of those rules of the department which apply to the facility at the time of renewal.

A permitted animal feeding operation which does not meet the operation-permit requirements of subrules 65.3(1) to 65.3(3) will be exempted from the need to retain that permit at the time of permit renewal, and the existing operation permit will not be renewed.

65.5(11) Permit modification, suspension or revocation. The department may modify, suspend or revoke in whole or part any operation permit for cause. Cause for modification, suspension or revocation of a permit may include the following:

- a. Violation of any term or condition of the permit.
- b. Obtaining a permit by misrepresentation of fact or failure to disclose fully all material facts.
- c. A change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge.
- d. Failure to submit the records and information that the department requires in order to ensure compliance with the operation and discharge conditions of the permit.

567—65.6(455B) Construction permits.**65.6(1) *Animal feeding operations required to obtain a construction permit.***

a. An animal feeding operation covered by the operation permit provisions of subrules 65.3(1) to 65.3(3) shall obtain a construction permit prior to constructing, installing, or modifying a manure control system for that operation.

b. Except as provided in subrule 65.6(2), a confinement feeding operation beginning construction, installation or modifications after March 20, 1996, shall obtain a construction permit prior to beginning construction, installation of an animal feeding operation structure used in that operation or prior to beginning significant modifications in the volume or manner in which the manure is stored if any of the following conditions exist:

(1) The confinement feeding operation uses an aerobic structure, anaerobic lagoon or earthen manure storage basin.

(2) The confinement feeding operation uses a formed manure storage structure and has an animal weight capacity of 625,000 pounds or more for animals other than bovine or 1,600,000 pounds or more for bovine.

(3) The confinement feeding operation structure which provides for the storage of manure exclusively in a dry form and has an animal weight capacity of 1,250,000 pounds or more for animals other than bovine or 4,000,000 pounds or more for bovine.

(4) The confinement feeding operation uses an egg washwater storage structure.

(5) The confinement feeding operation has less than the animal weight capacity required by subparagraphs (2) or (3) of this paragraph to obtain a construction permit, but a person with an interest in the confinement feeding operation is subject to a pending enforcement action, or is classified as a habitual violator under Iowa Code section 455B.191. This requirement shall apply while the enforcement action is pending or for five years after the date of the last violation committed by the person or confinement feeding operation in which the person holds a controlling interest during which the person or operation was classified as a habitual violator.

65.6(2) *Animal feeding operations not required to obtain a construction permit.* A construction permit shall not be required for an animal feeding operation structure used in conjunction with a small animal feeding operation.

65.6(3) *Operations that shall not be issued construction permits.* The department shall not issue a construction permit to a person if an enforcement action by the department, relating to a violation of this chapter concerning a confinement feeding operation in which the person has an interest, is pending. The department shall not issue a construction permit to a person for five years after the date of the last violation committed by a person or confinement feeding operation in which the person holds a controlling interest during which the person or operation was classified as a habitual violator under Iowa Code section 455B.191.

65.6(4) *Plan review criteria.* Review of plans and specifications shall be conducted to determine the potential of the proposed manure control system to achieve the level of manure control being required of the animal feeding operation. In conducting this review, applicable criteria contained in federal law, state law, these rules, natural resource conservation service design standards and specifications unless inconsistent with federal or state law or these rules, and department of commerce precipitation data shall be used. If the proposed facility plans are not adequately covered by these criteria, applicable criteria contained in current technical literature shall be used.

65.6(5) *Expiration of construction permits.* The construction permit shall expire if construction, as defined in rule 65.7(455B), is not begun within one year of the date of issuance. The director may grant an extension of time to begin construction if it is necessary or justified, upon showing of such necessity or justification to the director, unless a person who has an interest in the proposed operation is the subject of a pending enforcement action, or a person who has a controlling interest in the proposed operation has been classified as a habitual violator.

567—65.7(455B) Construction. An applicant for a construction permit shall not begin construction at the location of a site planned for the construction of an animal feeding operation structure, including an aerobic structure, until the person has been granted a permit for the construction of the structure by the department. For purposes of these rules:

65.7(1) Construction begins when any of the following occurs:

- a. Excavation for a proposed animal feeding operation structure, or excavation for footings for a proposed animal feeding operation structure.
- b. Installation of forms for concrete for an animal feeding operation structure.
- c. Installation of piping for movement of manure within or between animal feeding operation structures.

65.7(2) Construction does not begin upon occurrence of any of the following:

- a. Removal of trees, brush, or other vegetative growth.
- b. Construction of driveways or roads.
- c. General earth moving for leveling or compacting at the site.
- d. Installation of temporary utility services.

567—65.8(455B) Construction permit application.

65.8(1) *Confinement feeding operations.* Application for a construction permit for a confinement feeding operation shall be made on a form provided by the department. The application shall include all of the information required. At the time the department receives a complete application, the department shall make a determination regarding the approval or denial of the permit within 60 days. However, the 60-day requirement shall not apply to an application if the applicant is not required to obtain a permit. A construction permit application for a confinement feeding operation shall include at least the following information:

- a. The owner and the name of the confinement feeding operation, including mailing address and telephone number.
- b. The contact person for the confinement feeding operation, including mailing address and telephone number.
- c. The location of the confinement feeding operation.
- d. Whether the application is for the expansion of an existing or the construction of a proposed confinement feeding operation.
- e. The animal weight capacity by animal species of the current confinement feeding operation to be expanded, if applicable, and of the proposed confinement feeding operation.
- f. For a manure storage structure in which manure is stored in a liquid or semiliquid form or for an egg washwater storage structure, an engineering report, construction plans and specifications, prepared by a licensed professional engineer or by Natural Resources Conservation Service personnel, that detail the proposed structures.
- g. A report on soil borings in the area of the aerobic structure, anaerobic lagoon, egg washwater storage structure, or manure storage basin, as described in subrule 65.16(6), if an earthen lagoon, structure or basin is being constructed. A minimum of three borings is required for structures of $\frac{1}{2}$ acre water surface area or less and four borings or more for structures larger than $\frac{1}{2}$ acre. For structures larger than four acres water surface area, one additional boring per acre is required for each acre above four acres. All borings shall be taken to a minimum of 10 feet below the bottom elevation of the proposed structure and one boring must be taken to 25 feet below the bottom.
- h. Payment to the department of the indemnity fund fee as required in Iowa Code section 204.3.

i. If the confinement feeding operation contains three or more animal feeding operation structures, a licensed professional engineer shall certify that either the construction of the structure will not impede the drainage through established drainage tile lines which cross property boundary lines or that if the drainage is impeded during construction, the drainage tile will be rerouted to reestablish the drainage prior to operation of the structure.

j. Information (e.g., maps, drawings, aerial photos) that clearly shows the proposed location of the animal feeding operation structures, any locations or objects from which a separation distance is required by Iowa Code sections 455B.162 and 455B.204 and that the structures will meet all applicable separation distances.

k. The names of all parties with an interest or controlling interest in the confinement feeding operation who also have an interest or controlling interest in at least one other confinement feeding operation in Iowa, and the names and locations of such other operations.

l. Documentation that a copy of the permit application and manure management plan has been provided to the county board of supervisors or county auditor in the county where the operation or structure subject to the permit is to be located, and documentation of the date received by the county.

65.8(2) *Open feedlots.* An open feedlot required to obtain a construction permit in accordance with the provisions of 65.6(1)“a” shall apply for a construction permit at least 90 days before the date that construction, installation, or modification of the manure control system is scheduled to start.

a. Application forms. Application for a construction permit for an open feedlot shall be made on a form provided by the department. The application shall be complete and shall include detailed engineering plans as determined necessary by the department.

b. Plan requirements. Manure control system plans for an open feedlot shall be designed and submitted in conformance with Iowa Code chapter 542B.

567—65.9(455B) County comment on construction permit application.

65.9(1) The applicant for a construction permit for a confinement feeding operation shall deliver in person or by certified mail a copy of the permit application and manure management plan to the board of supervisors of the county where the confinement feeding operation is located. Receipt of the application and manure management plan by the county auditor is deemed receipt of the application and manure management plan by the board of supervisors. Documentation of the delivery or mailing of the permit application and manure management plan shall be forwarded to the department. A permit shall not be issued until 30 days after the application and manure management plan have been received by the county board of supervisors.

65.9(2) The county board of supervisors may comment on the compliance of the construction permit application and manure management plan with the requirements in this chapter and Iowa Code chapter 455B for obtaining a construction permit. Any comment received by the department within 14 calendar days after receipt of the application by the board of supervisors shall be considered in the issuance of the permit. Comments may include, but are not limited to:

a. The existence of a surface tile intake of an agricultural drainage well or known sinkhole that was not included in the permit application;

b. The impact of the confinement feeding operation on the drainage in the area; and

c. The existence of structures or areas from which a separation distance is required under Iowa Code sections 455B.162 and 455B.204.

567—65.10(455B) Separation distance measurements. All distances between locations or objects provided in Iowa Code sections 455B.161 to 455B.165 and 455B.171 to 455B.192 and in this chapter shall be measured horizontally from the closest points of the locations or objects and the animal feeding operation structures. The distances shall be measured by standard survey methods. A property boundary line of a location, object or structure between which separation is required shall not be used as a point of measurement for the closest point unless the property boundary line coincides with the closest point of the location, object or structure.

65.10(1) The closest point of an anaerobic lagoon or earthen manure storage basin shall be measured from the point of maximum allowable level of manure as permitted pursuant to 65.2(3)“b.”

65.10(2) The closest point of a public use area shall be measured from the closest point of the facilities which attract the public to congregate and remain in the area for significant periods of time. A property boundary line of the land owned by the United States, the state, or a political subdivision which contains a public use area shall not be used as a point of measurement for the closest point unless the property boundary line coincides with the closest point of the facilities.

65.10(3) The closest point of a lake, river or stream from which separation is required by this chapter shall be measured from the ordinary high water mark.

65.10(4) The separation distance for an animal feeding operation constructed after May 31, 1995, or an animal feeding operation constructed and expanded after May 31, 1995, shall be measured from the closest point of the closest animal feeding operation structure.

65.10(5) The separation distance for an animal feeding operation structure qualifying for the exemption to separation distances under 65.11(7)“a” shall be measured from the closest point of the animal feeding operation structure which is constructed or expanded after May 31, 1995.

567—65.11(455B) Exemptions to separation distance requirements. A separation distance requirement in Iowa Code section 455B.162 shall not apply to the following:

65.11(1) A confinement feeding operation structure which provides for the storage of manure exclusively in a dry form.

65.11(2) A confinement feeding operation structure, other than an earthen manure storage basin, if the structure is part of a confinement feeding operation which qualifies as a small animal feeding operation.

65.11(3) An animal feeding operation structure which is constructed or expanded, if the titleholder of the land benefiting from the distance separation requirement executes a written waiver with the titleholder of the land where the structure is located, under such terms and conditions that the parties negotiate. The written waiver becomes effective only upon the recording of the waiver in the office of the recorder of deeds of the county in which the benefited land is located. The benefited land is the residence, commercial enterprise, bona fide religious institution, educational institution, or public use area from which separation is required. The filed waiver shall preclude enforcement by the department of the separation distance requirements of Iowa Code section 455B.162.

65.11(4) An animal feeding operation constructed or expanded closer than the required separation distance within the corporate limits of a city or the area within a separation distance required pursuant to Iowa Code sections 455B.161 to 455B.165 if the city approves a waiver which shall be memorialized in writing. The written waiver becomes effective only upon recording the waiver in the office of the recorder of deeds of the county in which the benefited land is located. The filed waiver shall preclude enforcement by the state of Iowa Code sections 455B.161 to 455B.165 as they relate to the animal feeding operation structure. However, this subrule shall not affect a separation distance required between residences, educational institutions, commercial enterprises, bona fide religious institutions, or public use areas, as provided in this rule.

65.11(5) An animal feeding operation structure which is located within any distance from a residence, educational institution, commercial enterprise, bona fide religious institution, city, or public use area, if the residence, educational institution, commercial enterprise or bona fide religious institution was constructed or expanded, or the boundaries of the city or public use area were expanded, after the date that the animal feeding operation was established. The date that the animal feeding operation was established is the date on which the animal feeding operation commenced operating. A change in ownership or expansion of the animal feeding operation shall not change the established date of operation.

65.11(6) An animal feeding operation constructed before May 31, 1995, which does not comply with the distance requirements of Iowa Code section 455B.162 on May 31, 1995, which continues to operate, but is not expanded.

65.11(7) An animal feeding operation constructed before May 31, 1995, but which does not comply with the distance requirements of Iowa Code section 455B.162 on May 31, 1995, which expands on or after May 31, 1995, if either of the following applies:

a. The animal feeding operation structure as constructed or expanded complies with the distance requirements of Iowa Code section 455B.162. The separation distance required shall be determined by the animal weight capacity of the entire animal feeding operation, including the existing operation.

b. All of the following apply to the expansion of the animal feeding operation:

(1) No portion of the animal feeding operation after expansion is closer than before expansion to a location or object for which separation is required under Iowa Code section 455B.162.

(2) The animal weight capacity of the animal feeding operation as expanded is not more than the lesser of the following:

1. Double its capacity on May 31, 1995.

2. 625,000 pounds animal weight capacity for animals other than bovine, or 1,600,000 pounds animal weight capacity for bovine.

567—65.12(455B) Separation distances from agricultural drainage wells or sinkholes. Iowa Code section 455B.204 provides that an animal feeding operation structure shall be located at least 500 feet away from the surface intake of an agricultural drainage well or known sinkhole. The exemptions to the separation distance requirements specified in rule 65.11(455B) shall not apply to this rule.

567—65.13(455B) Separation distances from certain lakes, rivers and streams. Iowa Code section 455B.204 provides that an animal feeding operation structure shall be located at least 200 feet away from a lake, river, or stream located within the territorial limits of the state, any marginal river area adjacent to the state, which can support a floating vessel capable of carrying one or more persons during a total of a six-month period in one out of ten years, excluding periods of flooding. The exemptions to the separation distance requirements specified in rule 65.11(455B) shall not apply to this rule. However, no distance separation is required between a location or object and a farm pond or privately owned lake, as defined in Iowa Code section 462A.2.

65.13(1) Table 1, "Navigable Rivers and Streams," at the end of this chapter implements Iowa Code section 455B.204 by identifying rivers and streams which meet the statutory requirement. For purposes of this rule, an animal feeding operation structure shall be located at least 200 feet away from the rivers and streams identified in Table 1.

65.13(2) Table 2, "Navigable Lakes," at the end of this chapter implements Iowa Code section 455B.204 by identifying lakes which meet the statutory requirement. For purposes of this rule, an animal feeding operation structure shall be located at least 200 feet away from the lakes identified in Table 2.

65.13(3) Other streams, lakes, or rivers may be considered during the construction permit application process, on a case-by-case basis. Any additions or other changes will be made to the lists through the rule-making process.

567—65.14(455B) Well separation distances.

65.14(1) For the construction of the following structures after March 20, 1996, the minimum distances between public and nonpublic water supplies shall be as follows:

<u>Structure</u>	<u>Nonpublic Water Supply</u>		<u>Public Water Supply</u>	
	<u>Shallow Well</u>	<u>Deep Well</u>	<u>Shallow Well</u>	<u>Deep Well</u>
Aerobic structure, anaerobic lagoon, earthen manure storage basin, egg washwater storage structure, and runoff control basin	400 feet	400 feet	1000 feet	400 feet
Formed manure storage structure, confinement building, feedlot solids settling facility, and open feedlot	200 feet	100 feet	200 feet	100 feet

65.14(2) Variances to this rule may be granted by the director if the applicant provides an alternative that is substantially equivalent to the rule or provides improved effectiveness or protection as required by the rule. Variance shall be made in writing at the time the application is submitted. The denial of a variance may be appealed to the commission.

567—65.15(455B) Manure storage structure design requirements.

65.15(1) *Drainage tile removal for new construction of a manure storage structure.* Prior to constructing a manure storage structure, other than storage of manure in an exclusively dry form, for which a construction permit is obtained, the site of the confinement feeding operation shall be investigated for drainage tile lines as provided in this subrule and all applicable records of known drainage tiles shall be examined.

a. Prior to excavation for the berm of an aerobic structure, anaerobic lagoon or earthen manure storage basin, an applicant for a construction permit for a confinement feeding operation shall follow any one of the following procedures:

(1) An inspection trench of at least ten inches wide shall be dug around the structure to a depth of at least 6 feet from the original grade and at least 50 feet from the projected outside edge of the berm.

(2) A core trench shall be dug to a depth of at least six feet from grade at the projected center of the berm. After investigation for tile lines and any discovered tile lines are removed, an additional containment barrier shall be constructed underneath the center of the berm. The secondary containment shall meet the same percolation standards as the lagoon or basin with the lateral flow potential restricted to one-sixteenth of an inch per day.

b. The drainage tile lines discovered near an aerobic structure, anaerobic lagoon or earthen manure storage basin shall be removed within 50 feet of the projected outside edge of the berm and within the projected site of the structure including under the berm. Drainage tile lines discovered upgrade from the structure shall be rerouted outside of 50 feet from the berm to continue the flow of drainage. Drain tile lines installed at the time of construction to lower a groundwater table may remain where located. A device to allow monitoring of the water in the drain tile lines installed to lower the groundwater table and a device to allow shutoff of the drain tile lines shall be installed if the drain tile lines do not have a surface outlet accessible on the property where the aerobic structure, anaerobic lagoon or earthen manure storage basin is located. All other drainage tile lines discovered shall be rerouted, capped, plugged with concrete, Portland cement concrete grout or similar materials, or reconnected to upgrade tile lines.

c. The applicant for a construction permit for a formed manure storage structure shall investigate for tile lines during excavation for the structure. Drainage tile lines discovered upgrade from the structure shall be rerouted around the formed manure storage structure to continue the flow of drainage. All other drainage tile lines discovered shall be rerouted, capped, plugged with concrete, Portland cement concrete grout or similar materials or reconnected to upgrade tile lines. Drain tile lines installed at the time of construction to lower a groundwater table may remain where located. A device to allow monitoring of the water in the drain tile lines installed to lower the groundwater table and a device to allow shutoff of the drain tile lines shall be installed if the drain tile lines do not have a surface outlet accessible on the property where the formed manure storage structure is located.

d. An applicant may utilize other proven methods approved by the department to discover drainage tile lines.

e. Variances to this subrule may be granted by the director if the applicant provides an alternative that is substantially equivalent to the subrule or provides improved effectiveness or protection as required by the subrule. A request for a variance shall be made in writing at the time the application is submitted. The denial of a variance may be appealed to the commission.

f. A waiver to this subrule may be granted by the director if sufficient information is provided that the location does not have a history of drainage tile.

65.15(2) *Drainage tile removal around an existing manure storage structure.*

a. The owner of an aerobic structure, anaerobic lagoon or earthen manure storage basin or earthen waste slurry storage basin, other than an egg washwater storage structure, that is part of a confinement feeding operation with a construction permit granted before March 20, 1996, but after December 31, 1992, shall inspect by March 20, 1997, for drainage tile lines as provided in this subrule and all applicable records of known drainage tiles shall be examined. Inspection shall be by digging an inspection trench of at least ten inches wide around the structure to a depth of at least 6 feet from the original grade and at least 50 feet from the outside edge of the berm. The owner first shall inspect the area where trenching is to occur and manure management records to determine if there is any evidence of leakage and, if so, shall contact the department for further instructions as to proper inspection procedures. The confinement feeding operation shall either obtain permission from an adjoining property owner or trench up to the boundary line of the property if the distance of 50 feet would require the inspection trench to go onto the adjoining property.

b. The owner of the confinement feeding operation may utilize other proven methods approved by the department to discover drainage tile lines.

c. The drainage tile lines discovered near an aerobic structure, anaerobic lagoon, earthen manure storage basin or earthen waste slurry storage basin, other than an egg washwater storage structure, shall be removed within 50 feet of the outside edge of the berm. Drainage tile lines discovered upgrade from the aerobic structure, anaerobic lagoon or earthen manure storage basin shall be rerouted outside of 50 feet from the berm to continue the flow of drainage. All other drainage tile lines discovered shall be rerouted, capped, plugged with concrete, Portland cement concrete grout or similar materials, or reconnected to upgrade tile lines. Drain tile lines that were installed at the time of construction to lower a groundwater table may either be avoided if the location is known or may remain at the location if discovered.

d. By March 20, 1997, the owner of an aerobic structure, anaerobic lagoon, earthen manure storage structure or an earthen waste slurry storage basin, that is part of a confinement feeding operation with a construction permit granted before March 20, 1996, including those granted before December 31, 1992, shall install a device to allow monitoring of the water in the drain tile lines installed to lower the groundwater table and to allow shutoff of the drain tile lines if the drain tile lines do not have a surface outlet accessible on the property where the aerobic structure, anaerobic lagoon, earthen manure storage basin or earthen waste slurry storage basin is located.

e. If the confinement feeding operation discovers drain tile that projects underneath the berm, it shall follow one of the following options:

(1) Contact the department to obtain permission to remove the drainage tile under the berm. The manure in the structure must be lowered to a point below the depth of the tile prior to removing the drainage tile from under the berm. Prior to using the structure, a new percolation test must be submitted to the department and approval received from the department.

(2) Grout the length of the tile under the berm to the extent possible. The material used to grout shall include concrete, Portland cement concrete grout or similar materials.

f. Variances to this subrule may be granted by the director if the applicant provides an alternative that is substantially equivalent to the subrule or provides improved effectiveness or protection as required by the subrule. A request for a variance shall be made in writing at least by January 20, 1997. The denial of a variance may be appealed to the commission.

g. A waiver to this subrule may be granted by the director if sufficient information is provided that the location does not have a history of drainage tile.

h. A written record describing the actions taken to determine the existence of tile lines, the findings, and actions taken to comply with this subrule, shall be prepared and maintained as part of the manure management plan records.

65.15(3) *Guidelines for drainage tile removal around an existing manure storage structure.*

a. It is recommended that a manure storage structure, other than the storage of manure in an exclusively dry form, that is part of a confinement feeding operation with a construction permit granted before January 1, 1993, be inspected for drainage tile lines as provided in this subrule, and all applicable records of known drainage tiles may be examined. For an aerobic structure, anaerobic lagoon, earthen manure storage basin or earthen waste slurry storage basin, inspection may be by digging an inspection trench of at least ten inches wide around the structure at a depth of at least 6 feet from the original grade and at least 50 feet from the projected outside edge of the berm. The owner first should inspect the area where trenching is to occur, and manure management records to determine if there is any evidence of leakage and, if so, shall contact the department for further instructions as to proper inspection procedures.

b. The drainage tile lines discovered may be removed within 50 feet of the outside edge of the berm. Drainage tile lines discovered upgrade from the structure may be rerouted outside of 50 feet from the berm to continue the flow of drainage. Drain tile lines that were installed at the time of construction to lower a groundwater table may either be avoided if the location is known or may remain at the location if discovered. All other drainage tile lines discovered may be rerouted, capped, plugged with concrete, Portland cement concrete grout or similar materials or reconnected to upgrade tile lines. The confinement feeding operation should either obtain permission from an adjoining property owner or trench up to the boundary line of the property if the distance of 50 feet would require the inspection trench to go onto the adjoining property.

c. If the confinement feeding operation discovers drain tile that projects underneath the berm, it may follow one of the following options:

(1) Contact the department to obtain permission to remove the drainage tile under the berm. The manure in the structure must be lowered to a point below the depth of the tile prior to removing the drainage tile from under the berm. Prior to using the structure, a new percolation test must be submitted to the department and approval received from the department.

(2) Grout the length of the tile under the berm to the extent possible. The material used to grout may include concrete, Portland cement concrete grout or similar materials.

d. The owner of a confinement feeding operation with a formed manure storage structure other than dry manure storage may inspect for tile lines. Drainage tile lines discovered upgrade from the structure may be rerouted around the formed manure storage structure to continue the flow of drainage. Drainage tile lines put in place during or after construction of the formed manure storage structure to relieve hydrologic pressure may remain where located. All other drainage tile lines discovered may be rerouted, capped, plugged with concrete, Portland cement concrete grout or similar materials or reconnected to upgrade tile line.

65.15(4) *Earthen waste slurry storage basins.* An earthen waste slurry storage basin shall have accumulated manure completely removed at least twice each year unless there is sufficient basin capacity to allow removal of manure once each year and maintain freeboard as determined pursuant to 65.2(3)“b.”

65.15(5) *Earthen manure storage basins.* An earthen manure storage basin shall have accumulated manure completely removed at least once each year. The earthen manure storage basin may have enough manure storage capacity to contain the manure from the confinement feeding operation for up to 14 months and maintain freeboard as determined pursuant to 65.2(3)“b.”

65.15(6) *Soil testing for earthen structures.* All subsurface soil classification shall be based on American Society for Testing and Materials Designations D 2487-92 or D 2488-90. Soil borings shall be taken to determine subsurface soil characteristics and groundwater elevation and direction of flow of the proposed site for the anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin. Soil borings shall be conducted by a qualified person normally engaged in soil testing activities. Data from the soil borings shall be submitted and shall include a description of the geologic units encountered, and a discussion of the effects of the soil and groundwater elevation and direction of flow on the construction and operation of the anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin. All soil borings shall be taken by a method that identifies the continuous soil profile and does not result in the mixing of soil layers. The number and location of the soil borings will vary on a case-by-case basis as determined by the designing engineer and accepted by the department. The following are minimum requirements:

a. A minimum of three borings is required for an anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin ½ acre water surface area or less, and four or more for an anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin larger than ½ acre. For an anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin larger than 4 acres water surface area, one additional boring per acre is required for each acre above 4 acres surface area.

b. All borings shall be taken to a minimum depth of ten feet below the bottom elevation of the anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin.

c. At least one boring shall be taken to a minimum depth of 25 feet below the bottom elevation of the anaerobic lagoon, aerobic structure, earthen egg washwater structure, or earthen manure storage basin or into bedrock, whichever is shallower.

d. Upon abandonment of the soil bore holes, all soil bore holes including those developed as temporary water level monitoring wells shall be plugged with concrete, Portland cement concrete grout, bentonite, or similar materials.

65.15(7) Hydrology.

a. *Groundwater table.* A minimum separation of four feet between the top of the liner on an earthen aerobic structure, anaerobic lagoon, or earthen manure storage basin floor and the groundwater table is recommended; however, in no case shall the top of the liner on an earthen aerobic structure, anaerobic lagoon, or earthen manure storage basin floor be below the groundwater table. If the groundwater table is less than two feet below the top of the liner on an earthen aerobic structure, anaerobic lagoon, or earthen manure storage basin floor, the aerobic structure, anaerobic lagoon, or earthen manure storage basin shall be provided with a synthetic liner as described in 65.15(12)“f.”

b. *Permanent artificial lowering of groundwater table.* The groundwater table around an anaerobic lagoon, aerobic structure, or earthen manure storage basin may be artificially lowered to levels required in paragraph “a” by using a gravity flow tile drainage system or other permanent nonmechanical system for artificial lowering of the groundwater table. Detailed engineering and soil drainage information shall be provided to confirm the adequacy of the proposed permanent system to provide the required drainage without materially increasing the seepage potential of the site. (See subrule 65.15(1) for monitoring and shutoff requirements for drainage tile lines installed to lower the groundwater table.) For formed manure storage structures partially or completely constructed below the normal soil surface, a tile drainage system or other permanent system for artificial lowering of groundwater levels shall be installed around the structure if the groundwater table is above the bottom of the structure.

c. *Determination of groundwater table.* For purposes of this rule, groundwater table means the average annual high water table determined by the licensed professional engineer, and approved by the department as part of issuing a construction permit to the animal feeding operation, pursuant to this subrule. Current groundwater levels shall be measured using three temporary monitoring wells by measuring the water level seven days after installation. The borings required in subrule 65.15(6) may be completed as temporary monitoring wells for this purpose. The monitoring well measurements, along with evaluation of site soils for indicative features such as color and mottling, other existing water table data, and other pertinent information shall be used to determine the average annual high water table. If a drainage system for artificially lowering the groundwater table will be installed in accordance with the requirements of paragraph 65.15(7)“b,” the level to which the groundwater table will be lowered will be considered to represent the average annual high water table.

65.15(8) Karst features. The lagoon or basin shall not be located on sites that exhibit Karst features such as sinkholes, or solution channeling generally occurring in areas underlain by limestone or dolomite.

65.15(9) Bedrock separation. A separation of ten feet between the lagoon or basin bottom and any bedrock formations is recommended with a minimum separation of four feet required.

65.15(10) *Flooding protection.* The top of the lagoon or basin embankment shall be constructed at least one foot above the elevation of the 100-year flood.

65.15(11) *Lagoon and basin seals.* A lagoon or basin shall be sealed such that seepage loss through the seal is as low as practically possible. The percolation rate shall not exceed 1/16 inch per day at a water depth of six feet. Following construction of the lagoon or basin, the results of a testing program which indicates the adequacy of the seal shall be provided to this department in writing prior to start-up of operation.

65.15(12) *Aerobic structure, anaerobic lagoon, or earthen manure storage basin liner design and construction standards.* An aerobic structure, anaerobic lagoon or earthen manure storage basin which receives a construction permit after January 21, 1998, shall comply with the following minimum standards in addition to subrule 65.15(11).

a. If the location of the proposed aerobic structure, anaerobic lagoon or earthen manure storage basin contains suitable materials as determined by the soil borings taken pursuant to subrule 65.15(6), those materials shall be compacted to establish a minimum of a 12-inch liner. A minimum initial over-excavation of 6 inches of material shall be required. The underlying material shall be scarified, re-worked and compacted to a depth of 6 inches. The overexcavated materials shall be replaced and compacted.

b. If the location of the proposed aerobic structure, anaerobic lagoon or earthen manure storage basin does not contain suitable materials as determined by the soil borings taken in subrule 65.15(6), suitable materials shall be compacted to establish a minimum of a 24-inch liner.

c. Where sand seams, gravel seams, organic soils or other materials that are not suitable are encountered during excavation, the area where they are discovered shall be overexcavated a minimum of 24 inches and replaced with suitable materials and compacted.

d. All loose lift material must be placed in lifts of nine inches or less and compacted. The material shall be compacted at or above optimum moisture content and meet a minimum of 95 percent of the maximum density as determined by the Standard Proctor test after compaction.

e. For purposes of this rule, suitable materials means soil, soil combinations or other similar material that is capable of meeting the permeability and compaction requirements. Sand seams, gravel seams, organic soils or other materials generally not suitable for anaerobic lagoon, aerobic structure, or earthen manure storage basin construction are not considered suitable materials.

f. As an alternative to the above standards, a synthetic liner may be used. If the use of a synthetic liner is planned for an earthen aerobic structure, an anaerobic lagoon, or earthen manure storage basin, the permit application shall outline how the site will be prepared for placement of the liner, the physical, chemical, and other pertinent properties of the proposed liner, and information on the procedures to be used in liner installation and maintenance. In reviewing permit applications which involve use of synthetic liners, DNR will consider relevant synthetic liner standards adopted by industry, governmental agencies, and professional organizations as well as technical information provided by liner manufacturers and others.

65.15(13) *Anaerobic lagoon design standards.* For manure control systems that include the use of an anaerobic lagoon, the design criteria contained in 567—Chapters 22 and 23 for animal feeding operations shall be used.

65.15(14) Concrete standards. A concrete formed manure storage structure, other than for the storage of manure in an exclusively dry form in a roofed structure, that is part of a confinement feeding operation which receives a construction permit after January 21, 1998, shall meet the minimum design and construction standards as described in this rule.

a. All concrete used in the construction of the formed manure storage structure shall have a minimum compressive strength of 4000 pounds per square inch (psi) as batched and delivered for use and meet the engineering design standards as placed. However, the minimum compressive strength for concrete used in footings shall be 3000 psi as batched and delivered for use and meet the engineering design standards as placed. All rebar used in the construction of the concrete formed manure storage structure shall be made of a minimum of grade 40 steel.

b. The floor of a concrete formed manure storage structure shall be a minimum of 5 inches thick. The floor of any concrete formed manure storage structure with a designed manure storage depth of 48 inches or more shall be reinforced with a minimum of either $6 \times 6 \times 10 \times 10$ steel wire mesh or #4 rebar placed a maximum of 18 inches on center in each direction, or the steel equivalent.

c. The load-bearing walls of any concrete formed manure storage structure with a designed manure storage depth of less than 120 inches shall be a minimum of 6 inches thick. The load-bearing walls of any concrete formed manure storage structure with a designed manure storage depth of 120 inches or greater shall be a minimum of 8 inches thick. The walls shall be reinforced with a minimum of either #4 rebar placed a maximum of 18 inches on center in each direction or the steel equivalent.

d. All load-bearing walls shall be formed with rigid forming systems and shall not be ground formed.

e. All construction joints of the formed manure storage structure shall be poured to prevent discontinuity of steel and concrete and have rebar placed through the joint that is properly spliced and overlaid.

65.15(15) Berm erosion control.

a. The following requirements shall apply to anaerobic lagoons, earthen aerobic structures, or earthen manure storage basins which receive a construction permit after January 21, 1998.

(1) Concrete, riprap, synthetic liners or similar erosion control materials or measures shall be used on the berm surface below pipes where manure will enter the anaerobic lagoon, aerobic structure, or earthen manure storage basin.

(2) Concrete, riprap, synthetic liners or similar erosion control materials or measures of sufficient thickness and area to accommodate manure removal equipment and to protect the integrity of the liner shall be placed at all locations on the berm, side slopes, and base of the anaerobic lagoon, aerobic structure, or earthen manure storage basin where agitation or pumping may cause damage to the liner.

(3) Erosion control materials or measures shall be used at the corners of the anaerobic lagoon, aerobic structure, or earthen manure storage basin.

b. The owner of a confinement feeding operation with an anaerobic lagoon, earthen aerobic structure, earthen manure storage basin, earthen waste slurry storage basin, or earthen egg washwater storage structure shall inspect the structure berms at least semiannually for evidence of erosion. Erosion problems found which may impact either structural stability or liner integrity shall be corrected in a timely manner.

65.15(16) Agricultural drainage wells. After May 29, 1997, a person shall not construct a new or expand an existing earthen aerobic structure, earthen anaerobic lagoon, earthen manure storage basin, earthen waste slurry storage basin, or earthen egg washwater storage structure within an agricultural drainage well area.

567—65.16(455B) Manure management plan for construction permit applicants. The applicant for a construction permit for a confinement feeding operation shall submit a manure management plan, in addition to the construction permit application, that meets the requirements of Iowa Code section 455B.203 and this rule in order to receive a construction permit. A manure management plan shall not be required for an egg washwater storage structure. A construction permit for a confinement feeding operation shall not be granted unless the applicant has shown that sufficient cropland is available for manure application according to the manure management plan.

65.16(1) Manure application rate general rules. A confinement feeding operation that is required to submit a manure management plan to the department under this rule shall not apply manure in excess of the nitrogen use levels necessary to obtain optimum crop yields. Nitrogen application rates shall be based on total nitrogen content of the manure unless the applicant submits calculations to show that crop usage rates based on plant available nitrogen have not been exceeded for the crop schedule submitted. Information to complete the required calculations may be obtained from the tables in this chapter, actual testing samples or from other credible sources including, but not limited to, Iowa State University, the United States Department of Agriculture, a licensed professional engineer, or an individual certified as a crop consultant under the American Registry of Certified Professionals in Agronomy, Crops, and Soils (ARCPACS) program, the Certified Crop Advisors (CCA) program, or the Registry of Environmental and Agricultural Professionals (REAP) program.

65.16(2) Manure management plan for sales of manure. An applicant for a construction permit for a confinement feeding operation that sells all or a portion of its manure shall be required to submit, in addition to the construction permit application, the following:

a. The confinement feeding operation that will sell manure as a commercial fertilizer or soil conditioner regulated by the Iowa department of agriculture and land stewardship under Iowa Code chapter 200 shall submit, as its manure management plan for that portion of manure which it intends to sell, documentation that manure will be sold pursuant to Iowa Code chapter 200.

b. The applicant that is not fully covered by paragraph “a” above and has an established practice of selling manure, or the confinement feeding operation that contains an animal species for which selling manure is a common practice shall submit a manure management plan providing the information specified in subparagraphs (1) through (3) of this paragraph. Selling manure means the transfer of ownership of the manure for monetary or other valuable consideration. Selling manure does not include a transaction where the consideration is the value of the manure, or where an easement, lease, license or other agreement granting the right to use the land for manure application is executed. The confinement feeding operation shall sell the manure to buyers with the sufficient number of acres according to the manure management plan and the manure sales forms for the application of the manure sold to the buyer from the confinement feeding operation.

(1) The manure management plan shall include:

1. An estimate of the number of acres required for manure application calculated by dividing the total nitrogen available to be applied from the confinement feeding operation by the crop usage rate. Crop usage rate may be estimated by using a corn crop usage rate factor and an estimate of the optimum crop yield for the property in the vicinity of the confinement feeding operation.

2. The total nitrogen available to be applied from the confinement feeding operation.

3. An estimate of the annual animal production and manure volume or weight produced.

4. A manure sales form.

5. Statements of intent. The number of acres indicated in the statements of intent shall be sufficient according to the manure management plan to apply the manure from the confinement feeding operation. The permit holder for an existing confinement feeding operation with a construction permit may submit past records of manure sales instead of statements of intent.

- (2) The manure sales form shall include the following information:
 1. A place for the name and address of the buyer of the manure.
 2. A place for the quantity of manure purchased.
 3. The optimum crop yield and crop usage rate for the crops indicated in the crop schedule.
 4. A place for manure application methods and the timing of manure application.
 5. A place for the location of field where the manure will be applied including the number of acres where the manure will be applied.
 6. A place for the manure application rate.
- (3) The statements of intent shall include the following information:
 1. The name and address of the person signing the statement.
 2. A statement indicating the intent of the person to purchase the confinement feeding operation's manure.
 3. The location of the farm where the manure can be applied including the total number of acres available for manure application.
 4. The signature of the person who may purchase the confinement feeding operation's manure.
- (4) The construction permit holder shall maintain in its records a current manure management plan and copies of all of the manure sales forms completed and signed by each buyer of the manure and the applicant for three years. A construction permit holder shall not be required to maintain current statements of intent.

65.16(3) *Manure management plan for nonsales of manure.* An applicant for a construction permit for a confinement feeding operation that will not sell all of its manure shall be required to submit the following as its manure management plan for that portion of the manure which will not be sold, in addition to the construction permit application:

- a. Calculations to determine the land area required for manure application.
- b. The total nitrogen available to be applied from the confinement feeding operation.
- c. The optimum crop yield and crop usage rate for the crops indicated in the crop schedule.
- d. Manure application methods and timing of the application.
- e. The location of manure application.
- f. An estimate of the annual animal production and manure volume or weight produced.
- g. Methods, structures or practices that will be used to reduce soil loss and potential surface water pollution.
- h. Methods or practices that will be utilized to reduce odor if spray irrigation equipment is used to apply manure.

65.16(4) *Manure management plan calculations to determine the land area required for manure application.* The number of acres required for manure application shall be determined by the following calculations:

- a. The manure management plan shall include a calculation of the total nitrogen available to be applied from the confinement feeding operation. Pounds of nitrogen per year shall be determined by using the table values referenced in Table 3, "Annual Pounds of Nitrogen Per Space of Capacity," at the end of this chapter, actual nitrogen test values, or by using other credible sources. Deductions are to be taken for nitrogen credits from legume production and planned commercial nitrogen fertilizer applications. The resulting value shall then be multiplied by the correction factor for nitrogen loss in subrule 65.16(5), paragraph "c," based on the application method.
- b. The manure management plan shall include a calculation of the crop usage rate by multiplying the optimum crop yield by the crop nitrogen usage rate factors for the crops named in the crop schedule for the cropland that will receive manure application.

c. The number of acres of cropland needed for manure application shall be calculated by dividing the total nitrogen available to be applied from the confinement feeding operation by the crop usage rate.

d. Manure from a confinement feeding operation may be applied in excess of the annual crop usage rate if soil testing determines that phosphorus or potassium levels are below recommended levels. However, maximum manure application rates shall not exceed 1.5 times the annual crop nitrogen usage rate; or, that rate which provides the recommended amount of phosphorus or potassium, whichever is more limiting, to obtain the optimum crop yield.

e. Nitrogen in addition to that allowed in the manure management plan may be applied up to the amounts, indicated by soil or crop nitrogen test results, necessary to obtain the optimum crop yield.

65.16(5) *Total nitrogen available from the confinement feeding operation.*

a. To determine the nitrogen content of the confinement feeding operation's manure per year, the applicant may use the factors in Table 3, "Annual Pounds of Nitrogen Per Space of Capacity," at the end of this chapter, multiplied by the number of spaces. If the applicant does not use the table to determine the nitrogen content of the confinement feeding operation's manure per year, the applicant shall use other credible sources for standard table values or the actual nitrogen content of the confinement feeding operation's manure. The actual nitrogen content shall be determined by a laboratory analysis of the manure from the confinement feeding operation's manure storage structure or from a manure storage structure with similar design and management as the confinement feeding operation's manure storage structure.

b. Credit for nitrogen from legume production in the year prior to growing corn or other grass crops shall be deducted from the total nitrogen to be applied according to the crop schedule submitted. Any planned commercial fertilizer nitrogen shall also be deducted from the total nitrogen that can be applied from manure sources.

c. The correction factor for nitrogen losses shall be determined for the method of application by the following, or from other credible sources for standard nitrogen loss values.

Surface-apply dry with no incorporation	0.70
Surface-apply liquids with no incorporation	0.75
Surface-apply liquid or dry with incorporation within 24 hours	0.95
Surface-apply liquid or dry with incorporation after 24 hours	0.80
Knifed in or soil injection of liquids	0.98
Irrigated liquids with no incorporation	0.60

65.16(6) *Calculating the crop usage rate.*

a. The optimum crop yield shall be determined for the cropland where the manure from the confinement feeding operation is to be applied. The applicant may use any of the following methods for calculating the optimum crop yield. To determine the optimum crop yield, the applicant may either exclude the lowest crop yield for the period of the crop schedule in the determination or allow for a crop yield increase of 10 percent. In using these methods, adjustment to update yield averages to current yield levels may be made if it can be shown that the available yield data is not representative of current yields.

(1) Soil survey interpretation record. The applicant shall submit a soil type map showing soil types for the fields where manure will be applied. The optimum crop yield for each field shall be determined by using the weighted average of the soil interpretation record yields for the soils on the cropland where the manure is to be applied. Soil interpretation records from the Natural Resources Conservation Service shall be used to determine yields based on soil type.

(2) Consolidated farm service agency yields. The applicant shall submit a copy of the consolidated farm service agency's determined crop yield or verified yield data for the cropland where the confinement feeding operation's manure is to be applied.

(3) Countywide crop insurance yields. The applicant shall submit a copy of the county average yields established for crops covered by the catastrophic crop insurance program administered by the consolidated farm service agency.

(4) Multiperil crop insurance proven yields. Yields established for the purpose of purchasing multiperil crop insurance shall be used as proven yield data. A copy of the yield information on the multiperil crop insurance form shall be submitted as proven yield verification. The optimum yield determined for each crop shall be the average of at least three years' yield data.

(5) Proven yields. The applicant shall submit the proven yield for the cropland that will be used for manure application and indicate the method used in determining the proven yield. Proven yields can only be used if a minimum of the most recent three years of yield data is submitted. The proven yields may exclude years in which a crop disaster occurred on the field or farm. These yields can be proven on a field-by-field or farm-by-farm basis.

b. Crop schedule. Crop schedules submitted shall include the name and total acres of the planned crop on a field-by-field or farm-by-farm basis where manure application will be made. A map can be used to indicate crop plans by field or farm. These plans shall name the crop that is planned to be grown in each successive growing season beginning with the crop planned or actually grown during the year this plan is submitted. The construction permit holder for a confinement feeding operation shall maintain records of a multiyear planned crop schedule, including the crop grown, or planned to be grown for the current year and the planned crops for successive years. The construction permit holder for a confinement feeding operation shall not be penalized for exceeding the nitrogen application rate for an unplanned crop, if crop schedules are altered because of weather, farm program changes, market factor changes, or other unforeseeable circumstances.

c. Crop usage rates. Crop nitrogen requirements may be based on the values in Table 4 at the end of this chapter or other credible sources. The applicant may use the corn crop usage rate and the optimum corn crop yield instead of the table value for a legume crop for those years in the crop schedule that are part of a corn/legume rotation.

65.16(7) *Manure application methods and timing.*

a. The applicant shall identify the methods that will be used to land-apply the confinement feeding operation's manure. Methods to land-apply the manure may include, but are not limited to, surface-apply dry with no incorporation, surface-apply liquids with no incorporation, surface-apply liquid or dry with incorporation within 24 hours, surface-apply liquid or dry with incorporation after 24 hours, knifed in or soil injection of liquids, or irrigated liquids with no incorporation.

b. The applicant shall identify the approximate time of year that land application of manure is planned. The time of year may be identified by season or month.

65.16(8) *Location of manure application.*

a. The manure management plan shall identify each farm where the manure will be applied, the number of acres that will be available for the application of manure from the confinement feeding operation, and the basis under which the land is available.

b. The manure management plan shall include a copy of each written agreement executed with the owner of the land where manure will be applied. The written agreement shall indicate the acres on which manure from the confinement feeding operation may be applied and the length of the agreement. A written agreement is not required if the land is rented for crop production by the applicant or is owned by the applicant.

c. The current manure management plan must also include a copy of each written agreement executed with the landowner when the location where the manure will be applied to land not owned or rented for crop production by the permit holder is changed. If a present location becomes unavailable for manure application, additional land for manure application shall be identified in the current manure management plan prior to the next manure application period.

65.16(9) *Estimate of annual animal production and manure volume or weight produced.* Volumes or weights of manure produced shall be estimated based on the numbers of animals, species, and type of manure storage used. The applicant shall submit the annually expected number of production animals by species. The volume of manure may be estimated based on the values in Table 5 at the end of this chapter and submitted as a part of the producer's manure management plan. If the applicant does not use the table to determine the manure volume from the confinement feeding operation, the applicant shall use other credible sources for standard table values or the actual manure volume from the confinement feeding operation.

65.16(10) *Methods to reduce soil loss and potential surface water pollution.* The manure management plan shall include an identification of the methods, structures or practices that will be used to prevent or diminish soil loss and potential surface water pollution during the application of manure. The manure management plan shall include a summary or copy of the conservation plan for the cropland where manure from the animal feeding operation will be applied if the manure will be applied on highly erodible cropland. The conservation plan shall be the conservation plan approved by the local soil and water conservation district or its equivalent. The summary of the conservation plan shall identify the methods, structures or practices that are contained in the conservation plan. The manure management plan may include additional information such as whether the manure will be injected or incorporated or the type of manure storage structure.

65.16(11) *Spray irrigation.* Subrule 65.2(10) for the use of spray irrigation equipment to apply manure shall be followed. An applicant who has identified spray irrigation equipment as the method of manure application shall identify any additional methods or practices to reduce potential odor, if any other methods or practices will be utilized.

65.16(12) *Record keeping.* The following records shall be maintained by the construction permit holder for a confinement feeding operation. This recorded information shall be maintained by the construction permit holder for a confinement feeding operation for three years following the year of application or for the length of the crop rotation, whichever is greater, and shall be made available to the department upon inspection pursuant to Iowa Code section 455B.203.

a. A copy of the confinement feeding operation's current manure management plan, including completed manure sales forms for a confinement feeding operation from which manure is sold. If manure management practices change, a person required to submit a manure management plan shall make appropriate changes consistent with this rule. If values other than the standard table values are used for manure management plan calculations, the source of the values used.

b. Methods of application when manure from the confinement feeding operation was applied.

c. Date(s) when the manure from the confinement feeding operation was applied or sold.

d. Location of the field where the manure from the confinement feeding operation was applied, including the number of acres.

e. The manure application rate.

f. The record of inspection required by subrule 65.15(2), paragraph "h," if applicable.

65.16(13) Existing construction permit holders. A construction permit holder for a confinement feeding operation with a construction permit granted after May 31, 1985, and before May 31, 1995, shall submit a manure management plan to the department by January 16, 1997. However, if a person required to submit a plan under this subrule violates a rule applicable to confinement feeding operations, the person shall submit the plan not later than 120 days following notice by the department. An existing confinement feeding operation with a construction permit for an egg washwater storage structure shall not be required to comply with this subrule. The manure management plan shall meet the requirements in this rule. The construction permit holder for a confinement feeding operation shall have sufficient acres of cropland available to apply the manure produced by the confinement feeding operation as indicated in the manure management plan.

567—65.17(455B) Construction certification. A confinement feeding operation which obtains a construction permit after March 20, 1996, shall submit to the department a certification from a licensed professional engineer that the manure storage structure in which manure is stored in a liquid or semiliquid form or the egg washwater storage structure was:

1. Constructed in accordance with the design plan. If actual construction deviates from the approved plans, identify all changes and certify that the changes were consistent with the standards of these rules or statute;
2. Supervised by the licensed professional engineer or a designee of the engineer during critical points of the construction;
3. Inspected by the licensed professional engineer after completion of construction and before commencement of operation; and
4. Constructed in accordance with the drainage tile removal standards of subrule 65.15(1), and including a report of the findings and actions taken to comply with this subrule.

567—65.18(455B) Manure management plans for confinement feeding operations utilizing formed manure storage structures for which a construction permit is not required.

65.18(1) Applicability. The owner of a confinement feeding operation which:

- a. Stores manure in a formed manure storage structure, other than exclusively in a dry form;
- b. Is first occupied by animals, other than bovine, after September 22, 1995; and
- c. Has an animal weight capacity of more than 200,000 pounds but less than the construction permit requirement in this chapter and former Chapter 65 for formed manure storage structures in effect at the time construction was begun, as defined in rule 65.7(455B); shall provide the department with a manure management plan meeting the requirements of this rule no later than 60 days prior to the first land application of the manure from the formed manure storage structure. To determine the animal weight capacity of a confinement feeding operation confining more than one species of animals or storing manure in more than one form, the animal capacity of bovine animals or animals confined in structures with manure stored exclusively in a dry form shall be excluded.

65.18(2) Contents. The manure management plan shall include:

- a. The owner and the name of the confinement feeding operation, including mailing address and telephone number.
- b. The contact person for the confinement feeding operation, including mailing address and telephone number.
- c. The location of the confinement feeding operation and the animal weight capacity of the operation.
- d. The calculations to determine the land area required for manure application, pursuant to 65.16(4).

e. The total nitrogen available to be applied from the confinement feeding operation, pursuant to 65.16(5).

f. The optimum crop yield and crop usage rate for the crops indicated in the crop schedule, pursuant to 65.16(6).

g. The manure application methods and timing of the application, pursuant to 65.16(7).

h. The location of manure application, pursuant to 65.16(8) "a," and the manure application rate.

65.18(3) General. The general rules for manure application rate in 65.16(1) shall apply.

65.18(4) Current manure management plan. The owner of a confinement feeding operation shall maintain a current manure management plan and maintain records sufficient to demonstrate compliance with the manure management plan. As required in Iowa Code section 455B.203(4), Iowa Code chapter 22 shall not apply to the records which shall be kept confidential by the department and its agents and employees. The contents of the records are not subject to disclosure except as follows:

a. Upon waiver by the owner of the confinement feeding operation.

b. In an action or administrative proceeding commenced under this chapter. Any hearing related to the action or proceeding shall be closed.

c. When required by subpoena or court order.

65.18(5) Records. Records to demonstrate compliance with the manure management plan shall include:

a. A copy of the current manure management plan.

b. The date, location, rate and method of each application of manure from the confinement feeding operation.

65.18(6) Record inspection. The department may inspect the confinement feeding operation at any time during normal working hours. The department shall assess and the confinement feeding operation shall pay the actual costs of the inspection. However, in order to access the operation, the departmental inspector must comply with standard disease control restrictions customarily required by the operation. The department shall comply with Iowa Code section 455B.103 in conducting an investigation of the premises where the animals are kept.

65.18(7) Enforcement action. An owner required to provide the department a manure management plan pursuant to this rule who fails to provide the department a plan or who is found in violation of the terms and conditions of the plan shall not be subject to an enforcement action other than assessment of a civil penalty pursuant to Iowa Code section 455B.191.

567—65.19(455B) Transfer of legal responsibilities or title. If title or legal responsibility for a permitted animal feeding operation and its animal feeding operation storage structure is transferred, the person to whom title or legal responsibility is transferred shall be subject to all terms and conditions of the permit and these rules. The person to whom the permit was issued and the person to whom title or legal responsibility is transferred shall notify the department of the transfer of legal responsibility or title of the operation within 30 days of the transfer. Within 30 days of receiving a written request from the department, the person to whom legal responsibility is transferred shall submit to the department all information needed to modify the permit to reflect the transfer of legal responsibility. A person who has been classified as a habitual violator under Iowa Code section 455B.191 shall not acquire legal responsibility or a controlling interest to any additional permitted confinement feeding operations for the period that the person is classified as a habitual violator. A person who has an interest in a confinement feeding operation that is the subject of a pending enforcement action shall not acquire legal responsibility or an interest to any additional permitted confinement feeding operations for the period that the enforcement action is pending.

567—65.20(455B) Validity of rules. If any part of these rules is declared unconstitutional or invalid for any reason, the remainder of said rules shall not be affected thereby and shall remain in full force and effect, and to that end, these rules are declared to be severable.

These rules are intended to implement Iowa Code sections 455B.134(3) “e,” 455B.171 to 455B.188, 455B.191 and 455B.201.

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*Effective date of Chapter 65 [DEQ, ch 20] delayed by the Administrative Rules Review Committee until October 25, 1976, pursuant to Iowa Code section 17A.4 amended by S.F. 1288, §8.

APPENDIX A

MANURE CONTROL ALTERNATIVES FOR OPEN FEEDLOTS

Introduction: Water pollution control requirements for animal feeding operations are given in Chapter 65 of the rules of the Iowa department of natural resources. Under these rules, open feedlots meeting the operation permit application requirements of subrules 65.3(1) or 65.3(2) must also comply with the minimum manure control requirements of subrule 65.2(2). Subrule 65.2(2) requires that all feedlot runoff and other manure flows resulting from precipitation events less than or equal to the 25-year, 24-hour rainfall event be collected and land applied.

This appendix describes five feedlot runoff control systems that meet the requirements of subrule 65.2(2). The systems differ in the volume of manure storage provided and in the frequency of manure application. In general, the time interval between required applications increases with increased storage volume.

A feedlot operator who constructs and operates a manure control facility in accordance with the requirements of any of these five systems will not have additional manure control requirements imposed, unless manure discharges from the facility cause state water quality standards violations. In describing the five systems, the major features of each are first reviewed, followed by detailed information on the construction and operation requirements of the system. The system descriptions are presented in this appendix as follows:

	System	Pages
System 1:	One Manure Application Period Per Year	2-3
System 2:	July and November Manure Application	4-5
System 3:	April, July, and November Manure Application	6-7
System 4:	Application After Each Significant Precipitation Event	8-9
System 5:	April/May and October/November Manure Application	10-11
Figures 1-4		12-13

SYSTEM 1: ONE MANURE APPLICATION PERIOD PER YEAR

MAJOR SYSTEM FEATURES:

- Adequate capacity must be provided to collect and store the average annual runoff from all feedlot and nonfeedlot areas which drain into the manure control system (additional storage is required if process waters or manure from other sources also drain into the control system).
- Collected manure must be removed from the control system and land applied at least once annually (interval between successive applications cannot exceed 12 months).

DETAILED SYSTEM REQUIREMENTS:

Manure Control System: The manure control system must be constructed to meet or exceed the following requirements:

1. **Solids Settling Facilities:** Manure solids settling facilities which meet or exceed the requirements of subrule 65.2(1) must precede the feedlot runoff control system.
2. **Feedlot Runoff Control System:** The feedlot runoff control system shall, as a minimum, have adequate capacity to store the total wastewater volume determined by summing the following:
 - A. The volume determined by multiplying the paved feedlot area which drains into the control system by the appropriate runoff value from Figure 1.
 - B. The volume determined by multiplying the paved feedlot area which drains into the control system by 1.5 times the appropriate runoff value from Figure 1.
 - C. The volume determined by multiplying the total area of cropland, pasture and woodland draining into the control system by the greater of the following:
 - The amount of runoff expected from these areas as a result of the 25-year, 24-hour precipitation event.*
 - The average annual runoff expected from these areas.*
 - D. The volume determined by multiplying the total roof, farmstead, and driveway area draining into the control system by the average annual runoff expected from these areas.*
 - E. The volume of process wastewater which drains into the control system during a 12-month period.
 - F. The volume of manure from other sources which discharges into the control system during a 12-month period.

*Expected 25-year, 24-hour and average annual runoff values shall be determined using runoff prediction methodologies of the U.S. Soil Conservation Service (or equivalent methodologies).

Manure Application Requirements: Manure must be removed from the manure control system and land applied in accordance with the following requirements:

1. **Solids Settling Facilities:** Collected solids must be removed from the solids settling facilities as necessary to maintain adequate capacity to handle future runoff events. As a minimum, solids shall be removed at least once annually.
2. **Feedlot Runoff Control System:** Accumulated manure shall be removed from the feedlot runoff control system and disposed of by land application at least once annually. The interval between successive application periods shall not exceed 12 months.

During application periods, land application shall be conducted at rates sufficient to ensure complete removal of accumulated manure from the runoff control system in ten or fewer application days. Manure removal is considered complete when the manure remaining in the runoff control system occupies less than 10 percent of the system's design manure storage volume.

Land application of manure shall be conducted on days when weather and soil conditions are suitable. Weather and soil conditions are normally considered suitable for manure application if:

- Land application areas are not frozen or snow-covered.
- Temperatures during application are greater than 32 degrees Fahrenheit.
- Precipitation has not exceeded 0.05 inch per day for each of the three days immediately preceding application and no precipitation is occurring on the day of application.

SYSTEM 2: JULY AND NOVEMBER MANURE APPLICATION

MAJOR SYSTEM FEATURES:

- Adequate capacity must be provided to collect and store the average runoff expected to occur over the eight-month period from December 1 through July 31 from all feedlot and nonfeedlot areas which drain into the manure control system (additional storage is required if process waters or manure from other sources also drain into the control system).
- Collected manure may be removed from the control system and land applied during any period of the year that conditions are suitable. While application during other periods will minimize the need for July and November application, sufficient manure must still be disposed of during July and November to reduce the volume of manure remaining in the control system during these months to less than 10 percent of the system's design manure storage volume.

DETAILED SYSTEM REQUIREMENTS:

Manure Control System: The manure control system must be constructed to meet or exceed the following requirements:

1. **Solids Settling Facilities:** Manure solids settling facilities which meet or exceed the requirements of subrule 65.2(1) must precede the feedlot runoff control system.
2. **Feedlot Runoff Control System:** The feedlot runoff control system shall, as a minimum, have adequate capacity to store the total wastewater volume determined by summing the following:
 - A. The volume determined by multiplying the unpaved feedlot area which drains into the control system by the appropriate runoff value from Figure 2.
 - B. The volume determined by multiplying the paved feedlot area which drains into the control system by 1.5 times the appropriate runoff value from Figure 2.

C. The volume determined by multiplying the total area of cropland, pasture and woodland draining into the control system by the greater of the following:

- The amount of runoff expected from these areas as a result of the 25-year, 24-hour precipitation event.*
- The average runoff expected to occur from these areas during the eight-month period from December 1 to July 31.*

D. The volume determined by multiplying the total roof, farmstead and driveway area draining into the control system by the average runoff expected to occur from these areas during the eight-month period from December 1 to July 31.*

E. The volume of process wastewater which drains into the control system during the eight-month period from December 1 through July 31.

F. The volume of manure from other sources which discharges into the control system during the eight-month period from December 1 through July 31.

*Expected 25-year, 24-hour runoff and average runoff for the eight-month period December 1 through July 31 shall be determined using runoff prediction methodologies of the U.S. Soil Conservation Service (or equivalent methodologies).

Manure Application Requirements: Manure must be removed from the manure control system and land applied in accordance with the following requirements:

1. **Solids Settling Facilities:** Collected solids must be removed from the solids settling facilities as necessary to maintain adequate capacity to handle future runoff events. As a minimum, solids shall be removed at least once annually.
2. **Feedlot Runoff Control System:**

A. A feedlot operator must comply with the following manure application requirements if application operations are limited to the months of July and November.

During these months, land application shall be conducted at rates sufficient to ensure complete removal of accumulated manure from the runoff control system in ten or fewer application days. Manure removal is considered complete when the manure remaining in the runoff control system occupies less than 10 percent of the system's design manure storage capacity.

During July and November, manure application operations shall be initiated on the first day that conditions are suitable for land application of manure, and application must continue on subsequent days that suitable conditions exist. If unfavorable weather conditions prevent complete application of manure to be accomplished during July or November, application must be continued into the following month. Manure application operations may cease when complete application has been achieved.

Weather and soil conditions are normally considered suitable for land application of manure if:

- Land application areas are not frozen or snow-covered.
- Temperatures during application are greater than 32 degrees Fahrenheit.
- Precipitation has not exceeded 0.05 inch per day for each of the three days immediately preceding application and no precipitation is occurring on the day of application.

B. A feedlot operator may dispose of accumulated manure during any period of the year that conditions are suitable. While application during other periods will minimize the need for application during July and November, the feedlot operator will still need to dispose of sufficient manure during July and November to reduce the manure volume remaining in the runoff control system during these months to less than 10 percent of the system's design manure storage capacity.

A feedlot operator who does not limit manure application operations to the months of July and November is not required to comply with the specific manure application requirements which apply when application is limited to those months. However, this does not relieve the feedlot operator of the responsibility to conduct application operations at rates and times which are sufficient to ensure that the manure volume remaining in the runoff control system during July and November will be reduced to less than 10 percent of the system's design manure storage capacity.

SYSTEM 3: APRIL, JULY AND NOVEMBER MANURE APPLICATION

MAJOR SYSTEM FEATURES:

- Adequate capacity must be provided to collect and store the average runoff expected to occur during the five-month period from December 1 through April 30 from all feedlot and nonfeedlot areas which drain into the manure control system (additional storage is required if process waters or manure from other sources also drain into the control system).
- Collected manure may be removed from the control system and land applied during any period of the year that conditions are suitable. While application during other periods will minimize the need for application during the specified application months, sufficient manure must still be disposed of during April, July and November to reduce the volume of manure remaining in the control system during these months to less than 10 percent of the system's design manure storage volume.

DETAILED SYSTEM REQUIREMENTS:

Manure Control System: The manure control system must be constructed to meet or exceed the following requirements:

1. **Solids Settling Facilities:** Manure solids settling facilities which meet or exceed the requirements of subrule 65.2(1) must precede the feedlot runoff control system.

2. Feedlot Runoff Control System: The feedlot runoff control system shall, as a minimum, have adequate capacity to store the total wastewater volume determined by summing the following:

A. The volume determined by multiplying the unpaved feedlot area which drains into the control system by the appropriate runoff value from Figure 3.

B. The volume determined by multiplying the paved feedlot area which drains into the control system by 1.5 times the appropriate runoff value from Figure 3.

C. The volume determined by multiplying the total area of cropland, pasture and woodland draining into the control system by the greater of the following:

- The amount of runoff expected from these areas as a result of the 25-year, 24-hour precipitation event.*

- The average annual runoff expected to occur from these areas during the five-month period from December 1 to April 30.*

D. The volume determined by multiplying the total roof, farmstead, and driveway area draining into the control system by the average runoff expected to occur from these areas during the five-month period from December 1 to April 30.*

E. The volume of process wastewater which drains into the control system during the five-month period from December 1 through April 30.

F. The volume of manure from other sources which discharges into the control system during the five-month period from December 1 through April 30.

*Expected 25-year, 24-hour runoff and average runoff for the five-month period December 1 through April 30 shall be determined using runoff prediction methodologies of the U.S. Soil Conservation Service (or equivalent methodologies).

Manure Application Requirements: Manure must be removed from the manure control system and land applied in accordance with the following requirements:

1. Solids Settling Facilities: Collected solids must be removed from the solids settling facilities as necessary to maintain adequate capacity to handle future runoff events. As a minimum, solids shall be removed at least once annually.

2. Feedlot Runoff Control System:

A. A feedlot operator must comply with the following manure application requirements if application operations are limited to the months of April, July and November.

During these months, land application shall be conducted at rates sufficient to ensure complete removal of accumulated manure from the runoff control system in ten or fewer application days. Manure removal is considered complete when the manure remaining in the runoff control system occupies less than 10 percent of the system's design manure storage capacity.

During April, July and November, manure application operations shall be initiated on the first day that conditions are suitable for land application of manure, and application must continue on subsequent days that suitable conditions exist. If unfavorable weather conditions prevent complete application of manure to be accomplished during any of these months, manure application must be continued into the following month. Manure application operations may cease when complete application has been achieved.

Weather and soil conditions are normally considered suitable for land application of manure if:

- Land application areas are not frozen or snow-covered.
- Temperatures during application are greater than 32 degrees Fahrenheit.
- Precipitation has not exceeded 0.05 inch per day for each of the three days immediately preceding application and no precipitation is occurring on the day of application.

B. A feedlot operator may dispose of accumulated manure during any period of the year that conditions are suitable. While application during other periods will minimize the need for application during April, July and November, the feedlot operator will still need to dispose of sufficient manure during July and November to reduce the manure volume remaining in the runoff control system during these months to less than 10 percent of the system's design manure storage capacity.

A feedlot operator who does not limit manure application operations to the months of April, July and November is not required to comply with the specific manure application requirements which apply when application is limited to those months. However, this does not relieve the feedlot operator of the responsibility to conduct application operations at rates and times which are sufficient to ensure that the manure volume remaining in the runoff control system during April, July and November will be reduced to less than 10 percent of the system's design manure storage capacity.

SYSTEM 4: APPLICATION AFTER EACH SIGNIFICANT PRECIPITATION EVENT

MAJOR SYSTEM FEATURES:

- Adequate capacity must be provided to collect and store the runoff expected to occur as a result of the 25-year, 24-hour precipitation event from all feedlot and nonfeedlot areas which drain into the manure control system (additional storage is required if process waters or manure from other sources also drain into the control system).
- Collected manure must be removed from the control system and land applied whenever the available (unoccupied) storage capacity remaining in the control system is less than 90 percent of that needed to store runoff from the 25-year, 24-hour storm-land application must begin on the first day that conditions are suitable and must continue until application is completed.

DETAILED SYSTEM REQUIREMENTS:

Manure Control System: The manure control system must be constructed to meet or exceed the following requirements:

1. **Solids Settling Facilities:** Manure solids settling facilities which meet or exceed the requirements of subrule 65.2(1) must precede the feedlot runoff control system.
2. **Feedlot Runoff Control System:** The feedlot runoff control system shall, as a minimum, have adequate capacity to store the total wastewater volume determined by summing the following:
 - A. The volume determined by multiplying the total feedlot area which drains into the control system by the amount of runoff expected to occur from this area as a result of the 25-year, 24-hour precipitation event.*
 - B. The volume determined by multiplying the total area of cropland, pasture and woodland draining into the control system by the amount of runoff expected to occur from these areas as a result of the 25-year, 24-hour precipitation event.*
 - C. The volume determined by multiplying the total roof, farmstead and driveway area draining into the control system by the amount of runoff expected to occur from these areas as a result of the 25-year, 24-hour precipitation event.*
 - D. The volume of process wastewater which drains into the control system during the five-month period from December 1 through April 30.
 - E. The volume of manure from other sources which discharges into the control system during the five-month period from December 1 through April 30.

*Expected 25-year, 24-hour runoff shall be determined by using runoff prediction methodologies of the U.S. Soil Conservation Service (or equivalent methodologies).

Manure Application Requirements: Manure must be removed from the manure control system and land applied in accordance with the following requirements:

1. **Solids Settling Facilities:** Collected solids must be removed from the solids settling facilities as necessary to maintain adequate capacity to handle future runoff events. As a minimum, solids shall be removed at least once annually.
2. **Feedlot Runoff Control System:** Accumulated manure shall be removed from the feedlot runoff control system and disposed of by land application following each precipitation or snowmelt runoff event which results in significant manure accumulations in the control system. Manure accumulations will be considered significant whenever the available (unoccupied) storage capacity remaining in the control system is less than 90 percent of that required to store the runoff from the 25-year, 24-hour storm.

Once the available storage capacity remaining in the manure control system is reduced to the point that manure application is necessary, manure application operations must be initiated on the first day that conditions are suitable for land application of manure, and application must continue on subsequent days that suitable conditions exist. Application operations may cease when the storage capacity available in the control system has been restored to greater than 90 percent of that required to store runoff from the 25-year, 24-hour storm.

During application periods, land application shall be conducted at rates sufficient to ensure complete removal of accumulated manure from the control system in ten or fewer application days.

Weather and soil conditions are normally considered suitable for land application of manure if:

- Land application areas are not frozen or snow-covered.
- Temperatures during application are greater than 32 degrees Fahrenheit.
- Precipitation has not exceeded 0.05 inch per day for each of the three days immediately preceding application and no precipitation is occurring on the day of application.

SYSTEM 5: APRIL/MAY AND OCTOBER/NOVEMBER APPLICATION

MAJOR SYSTEM FEATURES:

- Adequate capacity must be provided to collect and store the average runoff expected to occur over the eight-month period from October 1 through May 31 from all feedlot and nonfeedlot areas which drain into the manure control system (additional storage is required if process waters or manure from other sources also drain into the control system).
- Collected manure may be removed from the control system and land applied during any period of the year that conditions are suitable. While application during other periods will minimize the need for application during the April/May and the October/November periods, sufficient manure must still be disposed of during each of these two-month periods to reduce the volume of manure remaining in the control system during these periods to less than 10 percent of the system's design manure storage volume.

DETAILED SYSTEM REQUIREMENTS:

Manure Control System: The manure control system must be constructed to meet or exceed the following requirements:

1. **Solids Settling Facilities:** Manure solids settling facilities which meet or exceed the requirements of subrule 65.2(1) must precede the feedlot runoff control system.
2. **Feedlot Runoff Control System:** The feedlot runoff control system shall, as a minimum, have adequate capacity to store the total wastewater volume determined by summing the following:
 - A. The volume determined by multiplying the unpaved feedlot area which drains into the control system by the appropriate runoff value from Figure 4.
 - B. The volume determined by multiplying the paved feedlot area which drains into the control system by 1.5 times the appropriate runoff value from Figure 4.
 - C. The volume determined by multiplying the total area of cropland, pasture and woodland draining into the control system by the greater of the following:
 - The amount of runoff expected from these areas as a result of the 25-year, 24-hour precipitation event.*
 - The average runoff expected to occur from these areas during the eight-month period from October 1 to May 31.*
 - D. The volume determined by multiplying the total roof, farmstead, and driveway draining into the control system by the average runoff expected to occur from these areas during the eight-month period from October 1 to May 31.*
 - E. The volume of process wastewater which drains into the control system during the eight-month period from October 1 through May 31.
 - F. The volume of manure from other sources which discharges into the control system during the eight-month period from October 1 through May 31.

*Expected 25-year, 24-hour runoff and average runoff for the eight-month period October 1 through May 31 shall be determined using runoff prediction methodologies of the U.S. Soil Conservation Service (or equivalent methodologies).

Manure Application Requirements: Manure must be removed from the manure control system and land applied in accordance with the following requirements:

1. **Solids Settling Facilities:** Collected solids must be removed from the solids settling facilities as necessary to maintain adequate capacity to handle future runoff events. As a minimum, solids shall be removed at least once annually.
2. **Feedlot Runoff Control System:** At a minimum, accumulated manure shall be removed from the feedlot runoff control system and disposed of by land application during the periods April 1 through May 31 and October 1 through November 30.

During each of these periods, land application shall be conducted at rates sufficient to ensure complete removal of accumulated manure from the runoff control system in ten or fewer application days. Manure removal is considered complete when the manure remaining in the runoff control system occupies less than 10 percent of the system's design manure storage capacity.

A feedlot operator may dispose of accumulated manure during any period of the year that conditions are suitable. While application during other periods will minimize the need for application during the April/May and October/November periods, the feedlot operator will still need to dispose of sufficient manure during these periods to reduce the manure volume remaining in the runoff control system during these periods to less than 10 percent of the system's design manure storage capacity.

Land application of manure shall be conducted on days when weather and soil conditions are suitable. Weather and soil conditions are normally considered suitable for manure application if:

- Land application areas are not frozen or snow-covered.
- Temperatures during application are greater than 32 degrees Fahrenheit.
- Precipitation has not exceeded 0.05 inch per day for each of the three days immediately preceding application and no precipitation is occurring on the day of application.

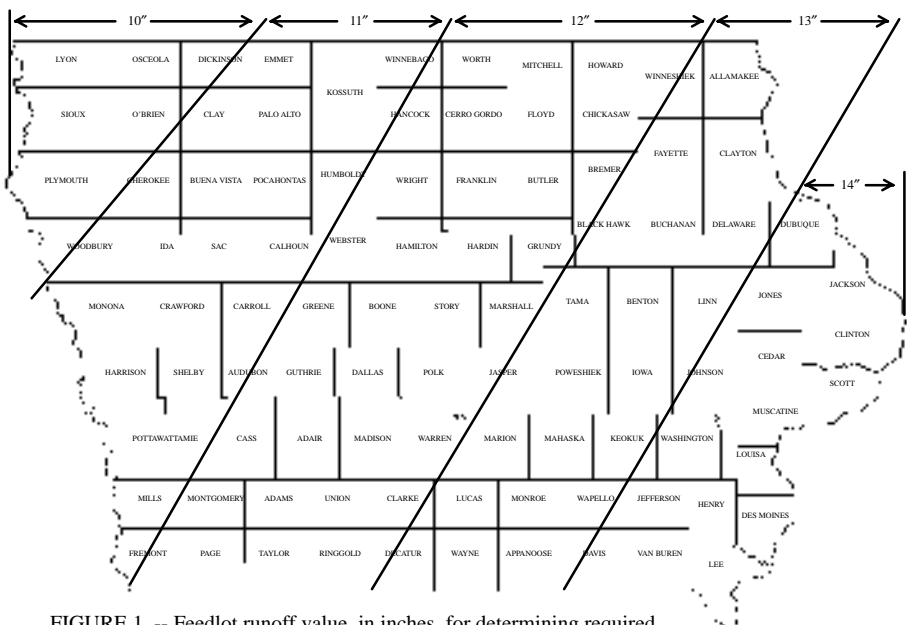


FIGURE 1. -- Feedlot runoff value, in inches, for determining required capacity of the "One Manure Application Per Year" manure control system.

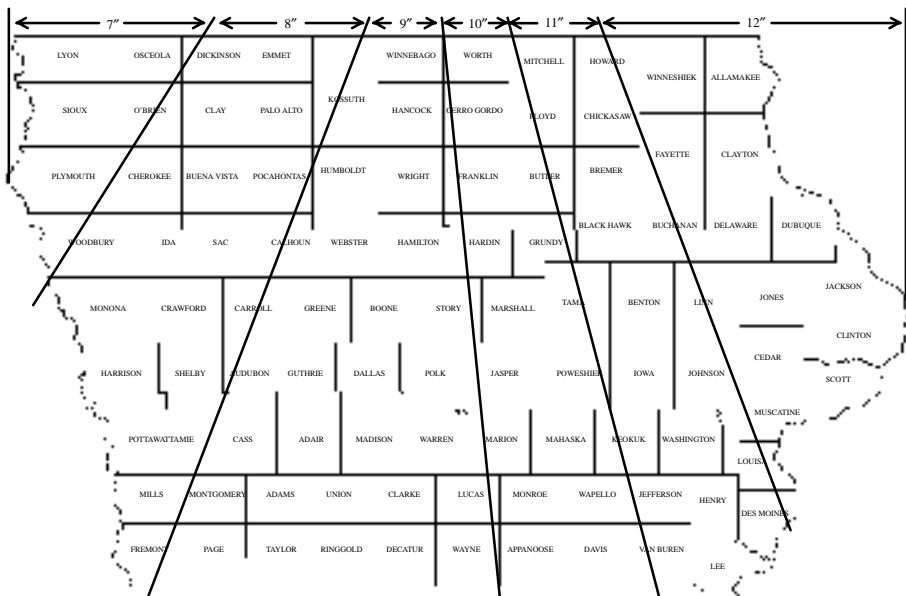


FIGURE 2. -- Feedlot runoff value, in inches, for determining required capacity of the "July and November Manure Application" manure control system.

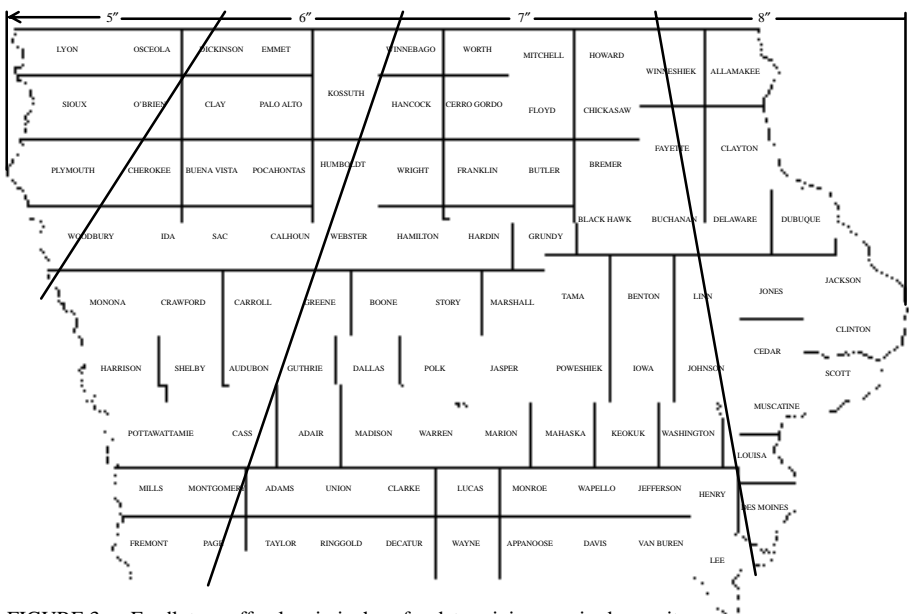


FIGURE 3. -- Feedlot runoff value, in inches, for determining required capacity of the "April, July, and November Manure Application" manure control system.

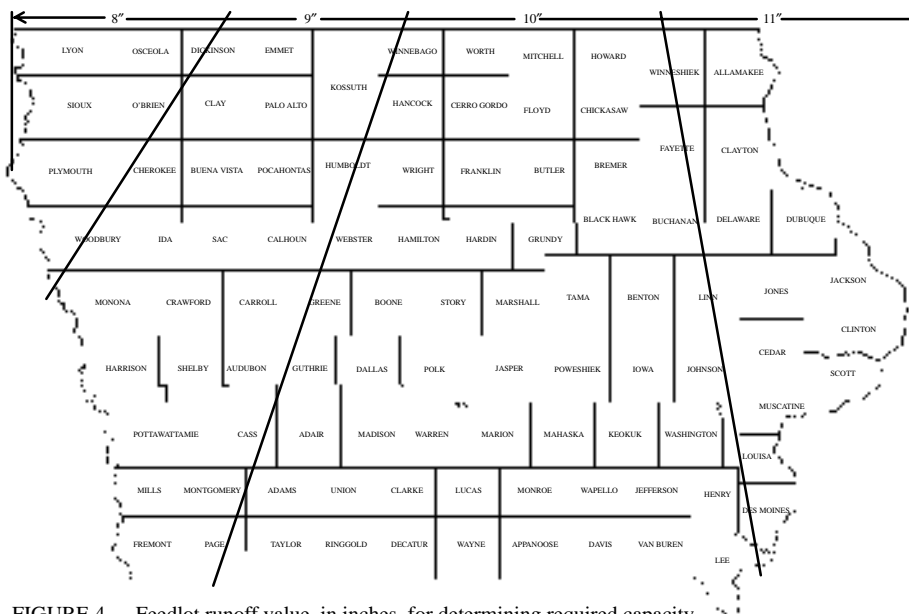


FIGURE 4. -- Feedlot runoff value, in inches, for determining required capacity of the "April/May and October/November Manure Application" manure control system.

APPENDIX B
GUIDELINES ON LAND DISPOSAL OF ANIMAL WASTES
Rescinded IAB 2/14/96, effective 3/20/96

TABLE 1
Navigable Rivers and Streams

County	River/Stream	Location
Adair	Middle Nodaway River	Adams/Adair Line to Hwy. 92
	Middle River	All
	West Fork-Middle Nodaway	Mouth to County Road N51
Adams	East Nodaway River	Adams/Taylor Line to County Road H24
	Middle Nodaway River	All
Allamakee	Bear Creek	Mouth, S1, T99N, R6W to West Line S30, T100N, R6W
	Mississippi River	All
	Paint Creek	Mouth to road crossing in S18, T97N, R4W
	Upper Iowa River	Mouth, S36, T100N, R4W to West Line S31, T100N, R6W
	Village Creek	Mouth, S33, T99N, R3W, upstream to Confluence with Unnamed Creek in S23, T98N, R4W
	Waterloo Creek	Mouth, S35, T100N, R6W to North Line S8, T100N, R6W
	Yellow River	Mouth, S34, T96N, R3W to Confluence with Upper Branch Yellow River, S4, T96N, R6W
Appanoose	Chariton River	Missouri Line to Rathbun Dam
	South Chariton River	Appanoose/Wayne Line to Rathbun Lake
Benton	Bear Creek	North County Line to Mouth at Cedar River, S21, T86N, R10W
	Cedar River	All
	Iowa River	All
	Opossum Creek	SE ¼ S5, T84N, R9W to East County Line
	Prairie Creek 2	Road Crossing N ½ S24, T83N, R12W to Benton/Linn Line
	Wolf Creek	All

Black Hawk	Beaver Creek	Mouth, S34, T90N, R14W to West County Line, S31, T90N, R14W
	Black Hawk Creek	Mouth, S22, T89N, R13W to West County Line S6, T87N, R14W
	Buck Creek	All
	Cedar River	All
	Crane Creek	Mouth to North County Line
	Miller's Creek	Mouth to West Line, S5, T87N, R12W
	Shell Rock River	Mouth, S4, T90N, R14W to North County Line, S4, T90N, R14W
	Spring Creek	Mouth to Confluence with Little Spring Creek, S11, T87N, R11W
	Wapsipinicon River	All
	West Fork Cedar River	All
Boone	Wolf Creek	Mouth, S19, T87N, R11W to South County Line
	Beaver Creek	West Line of S10, T82N, R28W to South County Line
	Des Moines River	All
	Squaw Creek	West Line of S8, T85N, R25W to East County Line
Bremer	Cedar River	All
	Crane Creek	South County Line to North Line, S9, T91N, R12W
	East Fork Wapsipinicon River	Mouth to North County Line
	Little Wapsipinicon River	East County Line to North Line, S2, T92N, R11W
	Quarter Section Run	Mouth to West Line, S35, T91N, R13W
	Shell Rock River	All
Buchanan	Wapsipinicon River	All
	Buck Creek	Mouth to West County Line
	Buffalo Creek	Mouth to Confluence of East and West Branches, S35, T90N, R8W
	Little Wapsipinicon River	Mouth to North County Line
	Otter Creek	Mouth to Confluence with Unnamed Creek, S9, T90N, R9W
	Wapsipinicon River	All
Buena Vista	Little Sioux River	All
	North Raccoon River	South County Line to North Line of S15, T91N, R36W

Butler	Beaver Creek	All
	Boylan Creek	Mouth to North Line, S23, T92N, R18W
	Coldwater Creek	Mouth to West Line S5, T93N, R17W
	Flood Creek	Mouth to North County Line
	Hartgrave Creek	Mouth to West County Line
	Johnson Creek	West County Line to Confluence with Beaver Creek
	Maynes Creek	West County Line to Mouth at West Fork of Cedar River
	Shell Rock River	All
	South Beaver Creek	Mouth to South County Line
	West Fork Cedar River	All
Calhoun	Camp Creek	Mouth to North Line S25, T87N, R33W
	Cedar Creek	South County Line to Confluence with West Cedar Creek
	Lake Creek	Mouth to West Line S25, T87N, R34W
	North Raccoon River	All
Carroll	Middle Raccoon River	South County Line to West Line of S23, T84N, R35W
	North Raccoon River	All
Cass	East Nishnabotna River	All
Cedar	Cedar River	All
	Rock Creek	Road Crossing North Line S1, T81N, R3W to Mouth at Cedar River
	Sugar Creek	Road Crossing North Line S29, T81N, R2W to South County Line
	Wapsipinicon River	All
Cerro Gordo	Beaverdam Creek	I-35 to Franklin County Line
	E Branch - Beaverdam Creek	Hwy. 65 to Mouth at Beaverdam Creek
	Shell Rock River	All
	Spring Creek	County Road B15 to Mouth at Winnebago River
	Willow Creek	Hwy. 18 to Mouth at Winnebago River
	Winnebago River	All

Cherokee	Grey Creek	North Line of S22, T93N, R40W to Mouth at Mill Creek
	Little Sioux River	All
	Maple River	North Line of S5, T90N, R39W to Ida County Line
	Mill Creek	North Line S13, T93N, R41W to Mouth at Little Sioux River
	Perry Creek	North Line of S5, T91N, R40W to Mouth at Little Sioux River
	Rock Creek	East Line of S4, T91N, R41W to Mouth at Little Sioux River
	Silver Creek	Mouth to North Line of S34, T90N, R40W
	West Fork, Little Sioux River	North Line of S12, T92N, R42W to Plymouth County Line
Chickasaw	Willow Creek	North Line S30, T91N, R41W to Mouth at Little Sioux River
	Cedar River	All
	Crane Creek	All
	East Fork Wapsipinicon River	South County Line to Confluence with Plum Creek, S16, T95N, R12W
	Little Cedar River	All
	Little Turkey River	All
	Little Wapsipinicon River	Mouth to North County Line
	Wapsipinicon River	All
Clay	Little Sioux River	All
	Ocheyedan River	All
Clayton	Bloody Run	Mouth, S15, T95N, R3W, upstream to second road bridge crossing the stream in the western portion of Basil Giard Claim No. 1
	Elk Creek	Mouth to Steeles Branch, S26, T91N, R4W
	Maquoketa River	South County Line to North Line S31, T91N, R6W
	Robert's Creek	Mouth to Confluence with Silver Creek, S17, T94N, R5W
	Sny Magill Creek	Mouth, S23, T94N, R3W upstream to Confluence with North Cedar Creek, S8, T94N, R3W
	Turkey River	All
	Volga River	All

Clinton	Brophys Creek	South Line of S4, T81N, R5E to Mouth at the Wapsipinicon River
	Drainage Ditch 12	West Line of S30, T82N, R2E to Mouth at the Wapsipinicon River
	Elk River	South Line of S5, T83N, R6E to Mouth at the Mississippi River
	Harts Mill Creek	East Line of S8, T81N, R6E to Mouth at Mill Creek
	Mill Creek	South Line of S14, T81N, R6E to Mouth with Mississippi River
	Mississippi River	All
	Silver Creek	South Line of S22, T82N, R3E to S6, T80N, R4E
	Wapsipinicon River	All
Crawford	Boyer River	All
	Soldier River	All
Dallas	Beaver Creek	All
	Des Moines River	All
	Middle Raccoon River	All
	Raccoon River	All
	South Raccoon River	All
Davis	Des Moines River	All
Decatur	Long Creek	DeKalb Wildlife Area to Mouth at the Thompson River
	Thompson River	All
	Weldon River	Missouri Border to Hwy. 2
Delaware	Buffalo Creek	All
	Coffin's Creek	Mouth to Road Crossing, Center of S26, T89N, R6W
	Maquoketa River	All
	North Fork Maquoketa River	All
	Plum Creek	Mouth to Confluence with Penn's Br., S18, T88N, R3W
	South Fork Maquoketa River	Mouth to West County Line

Des Moines	Brush Creek	South Line of S5, T69N, R3W to Mouth at the Skunk River
	Cedar Fork Creek	West Line of S31, T72N, R3W to Mouth at the Flint River
	Dolbee Creek	East Line of S24, T72N, R2W to S31, T71N, R1W
	Flint River	County Line to Mouth at the Mississippi River
	Knotty Creek	East Line of S25, T71N, R3W to the Mouth at the Flint River
	Hawkeye Creek	North Line of S30, T72N, R3W to Mouth at the Mississippi River
	Long Creek	South Line of S3, T69N, R4W to the Mouth at the Skunk River
	Mississippi River	All
	Skunk River	All
	Spring Creek	South Line of S15, T69N, R3W to Mouth at the Mississippi River
Dickinson	Tributary to Flint River	South Line of S27, T71N, R3W to Mouth at the Flint River
	Little Sioux River	All
	Milford Creek	S12, T98N, R37W to Mouth at Little Sioux River
	West Branch, Little Sioux River	South Line of S27, T100N, R38W to Mouth at West Fork of Little Sioux River
Dubuque	West Fork, Little Sioux River	South Line of S24, T100N, R38W to Mouth at Little Sioux River
	Catfish Creek	Mouth to North Line S16, T88N, R2E
	Little Maquoketa River	Mouth to Confluence with North Fork Little Maquoketa River, S31, T90N, R1E
	Lytle Creek	South County Line to Confluence with Buncombe Creek, S19, T87N, R2E
	Mississippi River	All
	North Fork Little Maquoketa River	Mouth to Confluence with Middle Fork Little Maquoketa River, S35, T90N, R1E
	North Fork, Maquoketa River	South County Line to Confluence with Hewitt Creek, Sec. 29, T89N, R2W
Emmet	Whitewater Creek	South County Line to Confluence with John's Creek, S25, T87N, R1W
	East Fork, Des Moines River	Tuttle Lake Outlet to East County Line
	West Fork, Des Moines River	All

Fayette	Little Turkey River	Mouth, S18, T95N, R8W to North Line S5, T95N, R10W
	Little Wapsipinicon River	All
	Turkey River	All
	Volga River	East County Line to Confluence with Little Volga River, S2, T92N, R9W
Floyd	Cedar River	All
	Flood Creek	South County Line to Road Crossing, S32, T96N, R17W
	Little Cedar River	All
	Rock Creek	Mouth, S24, T97N, R17W to North County Line
	Shell Rock River	All
Franklin	Winnebago River	All
	Bailey Creek	South Line of S13, T93N, R20W to Mouth at the West Fork, Cedar River
	Beaverdam Creek	North County Line to Mouth at the West Fork, Cedar River
	Hartgraves Creek	South Line of S28, T92N, R19W to East County Line
	Iowa River	All
	Maynes Creek	East Line of S30, T91N, R20W to East County Line
	Otter Creek	East Line of S31, T93N, R20W to Mouth at Hartgraves Creek
	Spring Creek	Beeds Lake Outlet to Mouth at Otter Creek
Fremont	West Fork, Cedar River	East Line of S19, T93N, R19W to East County Line
	East Nishnabotna River	Mouth at Nishnabotna River to East County Line
	Missouri River	All
	Nishnabotna River	Missouri/Iowa Line to South Line of S25, T68N, R41W
	West Nishnabotna River	Mouth at Nishnabotna River to North County Line
Greene	Buttrick Creek	Mouth to North County Line
	Cedar Creek	Mouth at North Raccoon River to North County Line
	North Raccoon River	All

Grundy	Black Hawk Creek	East Line of S35, T88N, R17W to Black Hawk County Line
	North Black Hawk Creek	NE ¼ S8, T88N, R15W to Mouth
	South Beaver Creek	E ½ of S3, T88N, R18W to Butler County Line
	Wolf Creek	N ½ of S31, T86N, R17W to Tama County Line
Guthrie	Brushy Creek	Mouth to North Line of S35, T81N, R33W (County Road F24)
	Middle Raccoon River	All
	Middle River	South County Line to County Road N54
	Mosquito Creek	S36, T81N, R32W to Hwy. 4, S17, T81N, R30W
	South Raccoon River	East County Line to County Road F32
Hamilton	Willow Creek	Mouth to North County Line
	Boone River	All
	Brewers Creek	Mouth at Boone River to County Road R27
	Eagle Creek	Mouth at Boone River to Wright County Line
	Skunk River	South County Line to County Road D41
Hancock	White Fox Creek	Mouth at Boone River to Wright County Line
	East Fork, Iowa River	South County Line to Hwy. 18
	West Fork, Iowa River	South County Line to County Road B55
	Winnebago River	All
Hardin	Elk Creek	Mouth at Iowa River to County Road D35
	Honey Creek	South County Line to County Road D65
	Iowa River	All
	South Fork, Iowa River	Mouth at Iowa River to Hwy. 359
Harrison	Boyer River	All
	Little Sioux River	All
	Missouri River	All
	Soldier River	All
Henry	Big Creek	North Line of S31, T72N, R5W to S19, T70N, R5W
	Cedar Creek	County Line to Mouth at the Skunk River
	Crooked Creek	All
	East Fork, Crooked Creek	All
	Little Cedar Creek	South County Line to Mouth at Cedar Creek
	Mud Creek	South Line of S15, T70N, R5W to Mouth at the Skunk River
	Skunk River	All

Howard	Crane Creek	South County Line to Hwy. 9
	Little Wapsipinicon River	South County Line to North Line S23, T98N, R14W
	North Branch Turkey River	Mouth to Highway 9
	Turkey River	East County Line to West Line of S1, T98N, R12W
Humboldt	Upper Iowa River	All
	Wapsipinicon River	All
	Des Moines River	South County Line to Confluence of East and West Fork of Des Moines River
	East Fork, Des Moines River	Mouth at the Des Moines River to North County Line
Ida	West Fork, Des Moines River	Mouth at the Des Moines River to West County Line
	Little Sioux River	All
	Maple River	All
Iowa	Bear Creek	West County Line to Mouth at the Iowa River
	Iowa River	All
	North Fork, English River	All
	Old Man Creek	West Line of S35, T79N, R10W to East County Line
Jackson	Bear Creek	Mouth to West County Line
	Big Mill Creek	Confluence with Little Mill Creek, S13, T86N, R4E upstream to West Line S9, T86N, R4E
	Brush Creek	North Line, S23, T85N, R3E upstream to Hwy. 62 bridge in S11, T85N, R3E
	Deep Creek	Mouth to South County Line
	Little Mill Creek	Mouth, S13, T86N, R4E upstream to West Line S23, T86N, R4E
	Lytle Creek	Mouth to North County Line
	Maquoketa River	All
	Mississippi River	All
	North Fork, Maquoketa River	West County Line to Mouth at the Maquoketa River
	Prairie Creek	Mouth to Hwy. 64, S20, R84N, R3E
Jasper	Indian Creek	All
	North Skunk River	All
	South Skunk River	All

Jefferson	Brush Creek	South Line of S18, T72N, R8W to the East County Line
	Cedar Creek	All
	Competine Creek	West County Line to Mouth at Cedar Creek
	Crooked Creek	All
	Skunk River	All
	Walnut Creek	East Line of S22, T73N, R9W to the Mouth at the Skunk River
Johnson	Cedar River	All
	Clear Creek	West County Line to Mouth at the Iowa River
	Iowa River	All
	Old Mans Creek	West County Line to Mouth at the Iowa River
Jones	Buffalo Creek	West County Line to Mouth at the Wapsipinicon River
	Maquoketa River	All
	North Fork, Maquoketa River	All
	Wapsipinicon River	All
	Whitewater Creek	Mouth to North County Line
Keokuk	Bridge Creek	South Line of S23, T76N, R12W to the Mouth at the North Skunk River
	Cedar Creek	East Line of S19, T76N, R13W to the Mouth at the North Skunk River
	North Skunk River	West County Line to Mouth at the Skunk River
	Rock Creek	South Line of S21, T76N, R12W to Mouth at Cedar Creek
	South Fork, English River	All
	South Skunk River	West County Line to Mouth at the Skunk River
	Skunk River	All
Kossuth	Buffalo Creek	West Line of S4, T97N, R27W to Mouth at the East Fork, Des Moines River
	East Fork, Des Moines River	All

Lee	Big Sugar Creek	South Line of S26, T69N, R6W to Mouth at the Mississippi River
	Des Moines River	All
	Little Sugar Creek	South Line of S24, T68N, R7W to Mouth at the Des Moines River
	Lost Creek	South Line of S32, T69N, R4W to Mouth at the Mississippi River
	Mississippi River	All
	Pitman Creek	South Line of S10, T68N, R5W to Mouth at the Mississippi River
	Skunk River	All
Linn	Buffalo Creek	All
	Cedar River	All
	Prairie Creek	West County Line to Mouth at Cedar River
	Wapsipinicon River	All
Louisa	Big Slough Creek	East Line of S7, T74N, R5W to Mouth at Buffington Creek
	Buffington Creek	Mouth to West Line of S18, T74N, R5W
	Cedar River	All
	East Fork Crooked Creek	All
	Goose Creek	West County Line to Mouth at the Iowa River
	Honey Creek	Mouth to East Line of S25, T76N, R5W
	Honey Creek	Mouth to South Line of S32, T73N, R3W (Morning Sun Twp.)
	Indian Creek	Mouth to North Line of S1, T75N, R4W
		All
	Iowa River	Mouth to East Line of S6, T74N, R4W
	Johnny Creek	South Line of S30, T75N, R5W to the Mouth at the Iowa River
	Long Creek	All
	Mississippi River	North County Line to County Road Bridge in S31, T75N, R3W
	Muscatine Slough	S16, T74N, R3W to Mouth at the Iowa River
	Muskrat Lake	Mouth to South Line of S16, T73N, R4W
Lucas	Otter Creek	Mouth to South Line of S36, T73N, R4W
	Roff Creek	Mouth to West Line of S6, T75N, R5W
	Short Creek	Mouth to West and South Lines of S35, T73N, R3W
	Smith Creek	
Lucas	Chariton River	Rathbun Lake to Hwy. 14
Lyon	Big Sioux River	All
	Little Rock River	East County Line to Mouth at Rock River
	Rock River	All

Madison	Clanton Creek	South Line of S32, T75N, R26W to the East County Line
	Middle River	All
	North Branch North River	Mouth to West County Line
	North River	East County Line to East Line of S17, T76N, R28W
	Thompson River	All
Mahaska	Cedar Creek	West County Line to Mouth at Des Moines River
	Des Moines River	All
	North Skunk River	All
	Skunk River	All
Marion	Des Moines River	All
	Skunk River	All
	Whitebreast Creek	West County Line to Mouth at Des Moines River
Marshall	Honey Creek	North County Line to Mouth at Iowa River
	Iowa River	All
	Minerva Creek	NW $\frac{1}{4}$ S9, T85N, R20W to Mouth at Iowa River
	Timber Creek	County Road Bridge in S24, T83N, R18W to Mouth at Iowa River
Mills	Missouri River	All
	West Nishnabotna River	All
Mitchell	Cedar River	South Line S13, T97N, R17W to North Line S8, T100N, R18W
	Deer Creek	Mouth to West County Line, S6, T99N, R18W
	Little Cedar River	South Line S13, T97N, R15W to North Line S7, T100N, R16W
	Otter Creek	Mouth at S21, T100N, R18W to North Line S11, T100N, R18W
	Rock Creek	South County Line to Road Crossing, West Line S7, T97N, R17W
	Spring Creek	Mouth to North Line of S29, T98N, R16W
	Turtle Creek	Mouth to North Line S7, T99N, R15W
	Wapsipinicon River	East County Line upstream to North Line of S20, T100N, R15W

Monona	Little Sioux River	All
	Maple River	Mouth at Little Sioux River to North County Line
	Missouri River	All
	Soldier River	All
Montgomery	West Fork, Little Sioux River	Mouth at Little Sioux River to North County Line
	East Nishnabotna River	All
	Middle Nodaway River	Mouth at Nodaway River to East County Line
	Nodaway River	All
Muscatine	Cedar River	All
	Mississippi River	All
	Mud Creek	West Line of S5, T78N, R1E to Mouth at Sugar Creek
	Muscatine Slough	South Line of S4, T76N, R2W to South County Line
	Pike Run	South Line of S34, T78N, R3W to S19, T77N, R3W
	Pine Creek	Wildcat Den State Park to Mouth at Mississippi River
	Sugar Creek	North County Line to Mouth at the Cedar River
	Wapsinonoc Creek	North County Line to Mouth at the Cedar River
	Weise Slough	S19, T78N, R3W
O'Brien	Little Sioux River	All
	Ocheyedan River	All
Osceola	Little Rock River	All
	Ocheyedan River	All
Page	East Nishnabotna River	All
	East Nodaway River	East County Line to Mouth at the Nodaway River
	Nodaway River	All
	Tarkio River	Hwy. 2 to South County Line
Palo Alto	Cylinder Creek	Mouth to Confluence with DD#21, S24, T95N, R32W
	Jack Creek	Mouth to West Line of S11, T97N, R33W
	West Fork, Des Moines River	All

Plymouth	Big Sioux River	All
	Floyd River	All
	West Fork, Little Sioux River	All
Pocahontas	Lizard Creek	West Line of S2, T90N, R31W to East County Line
	North Branch Lizard Creek	Mouth to North Line of S6, T91N, R31W
	Pilot Creek	West Line of S9, T92N, R31W to Mouth with the West Fork, Des Moines River
	West Fork, Des Moines River	All
Polk	Beaver Creek	All
	Des Moines River	All
	Four Mile Creek	Mouth to South Line of S1, T80N, R24W
	Indian Creek	All
	North River	All
	Raccoon River	All
	South Skunk River	All
	Walnut Creek	All
Pottawattamie	East Nishnabotna River	All
	Missouri River	All
	West Nishnabotna River	All
Poweshiek	Bear Creek	NW ¼ S8, T80N, R14W to the East County Line
	North Fork, English River	North Line of S23, T79N, R14W to East County Line
	North Skunk River	All
Ringgold	East Fork, Grand River	South County Line to Hwy. 2
	Grand River	South County Line to Hwy. 66
	Platte River	All
	Thompson River	All
Sac	Big Cedar Creek	West Line of S10, T88N, R35W to the Mouth at the North Raccoon River
	Boyer River	West Line of S5, T89N, R37W to South County Line
	Indian Creek	North Line of S7, T87N, R36W to Mouth at the North Raccoon River
	North Raccoon River	All
	Outlet Creek	East Line of S35, T87N, R36W to Mouth at Indian Creek

Scott	Lost Creek	North Line of S32, T80N, R5E to Mouth at the Wapsipinicon River
	Mississippi River	All
	Mud Creek	County Road Bridge in S11, T79N, R1E to Mouth at the Wapsipinicon River
	Wapsipinicon River	All
Sioux	Big Sioux River	All
	Floyd River	Hwy. 18 to South County Line
	Rock River	All
Story	East Indian Creek	Mouth to Highway 30
	Indian Creek	South County Line to Confluence with East and West Branches in S16, T82N, R22W
	Skunk River	All
	Squaw Creek	Mouth to West County Line
	West Indian Creek	Mouth to Highway 30
Tama	Iowa River	All
	Salt Creek	West Line of S28, T84N, R13W to Mouth at the Iowa River
	Wolf Creek	All
Taylor	East Fork, 102 River	Hwy. 49 to South County Line
	Platte River	All
	West Fork, 102 River	Hwy. 2 to South County Line
Union	Platte River	All
	Thompson River	All
Van Buren	Cedar Creek	All
	Des Moines River	All
Wapello	Des Moines River	All
Warren	Clanton Creek	West County Line to Mouth at Des Moines River
	Middle River	West County Line to Mouth at Des Moines River
	North River	All
	South River	All
	Whitebreast Creek	All

Washington	Camp Creek	North Line of S33, T77N, R7W to the Mouth at English River
	Clemons Creek	West Line of S9, T75N, R8W to the South Line S14, T75N, R8W
	Crooked Creek	East Line of S28, T76N, R9W to Henry County Line
	Dutch Creek	South Line of S21, T75N, R9W to the Mouth at the Skunk River
	East Fork, Crooked Creek	All
	English River	All
	Goose Creek	East County Line to East Line of S22, T76N, R6W
	Honey Creek	Lake Darling to Mouth at the Skunk River
	Iowa River	All
	Long Creek	East County Line to West Line of S26, T75N, R6W
	North Fork, Long Creek	East Line of S3, T75N, R7W to Mouth at Long Creek
	Skunk River	All
	Smith Creek	West County Line to Mouth at the English River
	South Fork, Long Creek	County Road H61 to Mouth at Long Creek
	Williams Creek	South County Line to Mouth at East Fork, Crooked Creek
Wayne	Chariton River	All
	South Chariton River	Rathbun Lake to County Road 556
Webster	Brushy Creek	North Line of S8, T88N, R27W to Mouth at the Des Moines River
	Deer Creek	North Line of S16, T90N, R29W to Mouth at the Des Moines River
	Des Moines River	All
	North Branch, Lizard Creek	West County Line to Mouth at Des Moines River
	Prairie Creek	West Line of S29, T88N, R28W to Mouth at the Des Moines River
	South Branch, Lizard Creek	Mouth to West County Line
Winnebago	Winnebago River	All

Winneshiek	Bear Creek	East County Line to County Road A24 in S34, T100N, R15W
	Canoe Creek	East County Line to West Line S8, T99N, R8W
	Little Turkey River	All
	North Bear Creek	Mouth, S25, T100N, R7W upstream to Confluence with Middle Bear Creek in S14, T100N, R7W
	Paint Creek	East Line S13, T99N, R7W to West Line S11, T99N, R7W
	Turkey River	All
	Upper Iowa River	All
Woodbury	Big Sioux River	All
	Floyd River	All
	Little Sioux River	All
	Maple River	All
	Missouri River	All
	West Fork, Little Sioux River	All
Worth	Beaver Creek	Hwy. 9 to Mouth at Winnebago River
	Deer Creek	County Road S56 to East County Line
	Elk Creek	Hwy. 105 to Mouth at Shell Rock River
	Shell Rock River	All
	Willow Creek	Hwy. 9 to Mouth at Winnebago River
	Winans Creek	Hwy. 9 to Mouth at Winnebago River
Wright	Boone River	All
	Eagle Creek	County Road R33 to South County Line
	East Fork, Iowa River	North County Line to Mouth at Iowa River
	Iowa River	South Line of S19, T93N, R23W to East County Line
	Otter Creek	Mouth to West Line S14, T92N, R26W
	West Fork, Iowa River	North County Line to Mouth at Iowa River
	White Fox Creek	County Road R38 to South County Line

TABLE 2
Navigable Lakes

County	Lake	Location
Adair	Greenfield Lake	1 mile Southwest of Greenfield
	Orient Lake	1 mile Southwest of Orient
	Meadow	6 miles Northeast of Greenfield
	Mormon Trail Lake	1½ miles Southeast of Bridgewater
	Nodaway Lake	2 miles Southwest of Greenfield
Adams	Binder Lake	1 mile Northeast of Corning
	Corning Reservoir	North edge of Corning
	Lake Icaria	4 miles North of Corning
Appanoose	Centerville Reservoir (Upper)	Southwest edge of Centerville
	Centerville Reservoir (Lower)	Southwest edge of Centerville
	Rathbun Reservoir	8 miles Northwest of Centerville
Audubon	Littlefield	4 miles East of Exira
Benton	Hannen Lake	4 miles Southwest of Blairstown
	Rodgers Park Lake	3½ miles Northwest of Vinton
Black Hawk	Alice Wyth Lake	North edge of Waterloo
	Big Woods Lake	Northwest edge of Cedar Falls
	Cedar Falls Reservoir	North edge of Cedar Falls
	East Lake (Quarry Lake)	North edge of Waterloo
	Fisher Lake	North edge of Waterloo
	George Wyth Lake	North edge of Waterloo
	Green Belt Lake	West edge of Waterloo
	Meyer Lake	Evansdale
	Mitchell Lake	Waterloo
	North Prairie Lake	Southwest edge of Cedar Falls
	South Prairie Lake	Southwest edge of Cedar Falls
Boone	Don Williams Lake	5 miles North of Ogden
	Sturtz	3 miles West of Boone
Bremer	Sweet Marsh (Martens Lake)	1 mile East of Tripoli
	Sweet Marsh (A)	2 miles East of Tripoli
	Waverly Impoundment	Waverly
Buchanan	Fontana Mill	½ mile South of Hazelton
	Independence Impoundment	Independence
	Kounty Pond	2½ miles Southeast of Brandon

Buena Vista	Gustafson Lake	1 mile South of Sioux Rapids
	Newell Pit	1½ miles Northwest of Newell
	Pickerel Lake	7 miles Northwest of Marathon
	Storm Lake	South edge of Storm Lake
Calhoun	Calhoun Wildlife Area	4 miles East of Manson
	Hwy. 4 Recreation Area	1 mile South of Rockwell City
	North Twin Lake	6 miles North of Rockwell City
	South Twin Lake	5 miles North of Rockwell City
Carroll	Swan Lake	3 miles Southeast of Carroll
Cass	Cold Springs Lake	1 mile South of Lewis
	Lake Anita	½ mile South of Anita
Cerro Gordo	Blue Pit	Southwest edge of Mason City
	Clear Lake	South edge of Clear Lake
	Fin and Feather Lake	3 miles South, 1 mile East of Mason City
Cherokee	Larson Lake	2½ miles East, 2 miles North of Aurelia
	Spring Lake	South edge of Cherokee
Chickasaw	Airport Park Lake	S35, T96N, R13W
	Nashua Impoundment	Nashua
	Split Rock Park Lake	5 miles Southwest of Fredericksburg
Clarke	East Lake	½ mile East of Osceola
	West Lake	2 miles West of Osceola
Clay	Elk Lake	3 miles South, 1 mile West of Ruthven
	Trumbull Lake	4 miles West, 5 miles North of Ruthven
Clinton	Kildeer and Malone	4 miles East of DeWitt
Crawford	Ahart/Rudd Natural Resource Area	2 miles South of Dow City, S21, T82N, R40W
	Nelson Park Lake	3 miles West, 3 miles North of Dow City
	Yellow Smoke Park	2 miles East, 2 miles North of Denison
Dallas	Beaver	1½ miles North of Dexter
Davis	Lake Fisher	2 miles Northwest of Bloomfield
	Lake Wapello	7 miles West of Drakesville

Decatur	Little River Watershed Lake Nine Eagles Lake Slip Bluff Lake	1 mile West of Leon 3½ miles Southeast of Davis City 2 miles Northwest of Davis City
Delaware	Backbone Lake Lake Delhi Quaker Mills Impoundment Silver Lake	4 miles Southwest of Strawberry Point 3 miles West of Delhi Northwest edge of Manchester Southeast edge of Delhi
Des Moines	Fourth Pumping Plant	6 miles North, 5 miles East of Kingston
Dickinson	Center Lake Diamond East Okoboji Lake Gar (Lower) Gar (Upper) Little Spirit Lake Minnewashta Silver Spirit Lake Swan Lake West Okoboji Lake	2 miles West, ½ mile South of Spirit Lake 2 miles East, 2 miles North of Montgomery East edge of Okoboji ½ mile South of Arnolds Park East of Arnolds Park 4 miles North of Orleans ½ mile South of Arnolds Park West Edge of Lake Park 1 mile North of Spirit Lake 2 miles North of Superior Northwest edge of Arnolds Park
Dubuque	Heritage Pond	2 miles North of Dubuque
Emmet	High Lake Ingham Lake Iowa Lake Tuttle Lake West Swan	6 miles East of Wallingford 6 miles East of Wallingford 6 miles North of Armstrong 1 mile East, 2 miles North of Dolliver 1½ miles South, 2 miles East of Gruver
Fayette	Lake Oelwein Volga Lake	Oelwein 3 miles North of Fayette
Franklin	Beeds Lake Interstate Park Pond Maynes Grove Lake	2 miles West, 1 mile North of Hampton 1 mile West, 2 miles South I-35 & Hwy. 3 4 miles South of Hampton on Hwy. 65
Fremont	McPaul "A" McPaul "B" Percival Lake Scott Lake "A"	2 miles South of Bartlett 2 miles South of Bartlett 1 mile North of Percival 1½ miles South of Bartlett

Greene	Spring Lake	4 miles Northwest of Grand Junction
Guthrie	Springbrook	7 miles North of Guthrie Center
Hamilton	Andersen Lake/Marsh Bjorkboda Marsh Briggs Wood Lake Gordons Marsh Little Wall Lake	1 Mile East of Jewell S36, T86N, R26W 2 miles South of Webster City S33 and 34, T88N, R26W 1½ miles South of Jewell
Hancock	Crystal Lake Eagle Lake Eldred Sherwood Lake West Twin Lake	North edge of Crystal Lake 3 miles Northeast of Britt 3 miles East, 1 mile North of Goodell 3 miles East of Kanawha
Hardin	Pine Lake (Lower) Pine Lake (Upper)	½ mile East of Eldora ½ mile East of Eldora
Harrison	DeSoto Bend Willow Lake	5 miles West of Missouri Valley 5½ miles West of Woodbine
Henry	City of Westwood Pond Crane's Pond East Lake Park Pond Geode Lake Gibson Park Pond	S11, T71N, R7W Mt. Pleasant Mt. Pleasant 4 miles Southwest of Danville S28, T71N, R7W
Howard	Lake Hendricks	½ mile Northeast of Riceville
Ida	Crawford Creek Moorehead Park Pond	3½ miles South of Battle Creek ½ mile North of Ida Grove
Iowa	Iowa Lake	5 miles North of Millersburg
Jackson	Green Island Lakes Middle Sabula Lake	1 mile East of Green Island West edge of Sabula
Jasper	Mariposa Lake Rock Creek Lake	5 miles Northeast of Newton 4 miles Northeast of Kellogg
Johnson	Coralville Reservoir Kent Park Lake Lake Macbride	4 miles North of Iowa City 2½ miles West of Tiffin 4 miles West of Solon

Jones	Central Park Lake	2 miles West of Center Junction
Keokuk	Belva Deer Ponds (4) Yen-Ruo-Gis	5 miles Northeast of Sigourney 2 miles North of Sigourney
Kossuth	Burt Lake Smith	4 miles West, 8 miles North of Swea City 3 miles North of Algona
Lee	Chatfield Lake Pollmiller Park Lake Shimek Forest Ponds (4)	3 miles Northwest of Keokuk ½ mile East of West Point 1 mile East of Farmington
Linn	Pleasant Creek Lake	4 miles North of Palo
Louisa	Cone Marsh Indian Slough Iowa Slough Lake Odessa	10 miles Northwest of Columbus Jct. 4 miles Northwest of Wapello 3 miles Southeast of Oakville 5 miles East of Wapello
Lucas	Brown's Slough Colyn North Colyn South Ellis Lake Morris Lake Red Haw Lake Stephens Forest Ponds #1 & #2 Williamson Pond	7 miles Southeast of Russell 4 miles South of Russell 4 miles South of Russell 1 mile East of Chariton 3 miles East of Chariton 1 mile East of Chariton 3 miles Southwest of Lucas 2 miles East of Williamson
Lyon	Fairview Pond Lake Pahoja	5 miles South, 3 miles West of Inwood 4 miles South, 2 miles West of Larchwood
Madison	Badger Creek Lake Winterset City Reservoir	5 miles Southeast of Van Meter 2 miles Northeast of Winterset
Mahaska	Hawthorne Lake Lake Keomah White Oak Lake	1 mile South of Barnes City 6 miles East of Oskaloosa 3 miles South of Rose Hill
Marion	Red Rock Roberts Creek Roberts Creek Lake	4 miles North of Knoxville 6 miles Northeast of Knoxville S28, 29, 33 and 34, Summit Twp.
Marshall	Green Castle Lake	1 mile South of Ferguson

Mills	Folsom Lake	2 miles West of Glenwood
	Keg Creek Lake	2 miles Southwest of Pacific Junction
	Mile Hill Lake	2 miles West of Glenwood
	P.J. Lake	1 mile Southwest of Pacific Junction
	Pony Creek Lake	3½ miles Northwest of Glenwood
Mitchell	Interstate Park	West edge of Mitchell
Monona	Blue Lake	3 miles West of Onawa
	Johnston Pit	1 mile East of Rodney
	McDonald Pit	1 mile East of Rodney
	Oldham Lake	1 mile North of Soldier
	Peters Park Pond	1 mile East of Rodney
	Savery	2 miles Southeast of Moorhead
	Utterback Pond	3 miles North, 3 miles West of Castana
Monroe	Albia (Upper)	1 mile North of Albia
	Albia (Lower)	1 mile North of Albia
	Cottonwood Pits	2 miles South of Albia
	Lattart	4 miles Southwest of Lovilla
	Lake Miami	5 miles Southeast of Lovilla
Montgomery	Hacklebarney East	4 miles North of Villisca
	Viking Lake	4 miles East of Stanton
O'Brien	Dog Creek Lake	2 miles East, ½ mile South of Sutherland
	Douma Area Park Pond	2 miles West, 1 mile South of Sanborn
	Hagan Wildlife Pond	S13, T95N, R41W
	Mill Creek Lake	1 mile East of Paullina
	Negus Wildlife Area Pond	S30, T94N, R39W
	Tjossem Park Ponds	S6, T95N, R40W
Osceola	Ashton Park Lake	S14, T98N, R42W
	Ashton Pits Access Area	S11, T98N, R42W
	Iowa Lake	S9, T100N, R39W
	Leinen Pits	S25, T99N, R42W
	May City Pit	S5, T98N, R39W
	Ocheyedan Pits	2 miles South of Ocheyedan
	Peters Pits	S19, T100N, R42W
	Thomas Pit	S36, T99N, R40W
	Willow Creek Lake	S31, T100N, R40W
Page	Pierce Creek Lake/Pond	5 miles North of Shenandoah
	Ross Area	8 miles Southeast of Clarinda

Palo Alto	Five Island Lake	North edge of Emmetsburg
	Lost Island Lake	3 miles North of Ruthven
	Rush Lake	9 miles West of Mallard
	Silver Lake	2 miles West of Ayrshire
	Virgin Lake	2 miles South of Ruthven
Plymouth	Deer Creek	11 miles West, 1 mile South, 1½ miles West of Merrill
	Hillview Lake	1 mile Northwest of Hinton
	Silver Maple Primitive Area Lake	3 miles Southeast of Akron
	Southeast Wildwood Park Pond	3 miles Northeast of Kingsley
Polk	Big Creek Lake	2 miles North of Polk City
	Bondurant	Northeast edge of Bondurant
	Carney Marsh	Ankeny
	Case's Lake	Des Moines, S13, T78N, R24W
	Dale Maffitt Reservoir	6 miles Southwest of Des Moines
	Easter Lake Park	Southeast edge of Des Moines
	Engledinger Marsh	6 miles Northwest of Bondurant
	Ft. Des Moines Pond	South edge of Des Moines
	Grays Lake	Fleur Dr., Des Moines
	Saylorville Reservoir	North edge of Des Moines
	Skull Pond	Jester Park near Polk City
Pottawattamie	Teal Pond	Jester Park near Polk City
	Thomas Mitchell Park Pond	2 miles Southwest of Mitchellville
	Two Dam Pond	Jester Park near Polk City
	Yellow Banks Park Pond	4 miles Southeast of Pleasant Hill
Pottawattamie	Arrowhead Pond	1½ miles Southeast of Neola
	Carter Lake	Carter Lake
	Lake Manawa	Southwest edge of Council Bluffs
Poweshiek	Arbor Lake	Grinnell
	Diamond Lake	1 mile West of Montezuma
Ringgold	Loch Ayr	2 miles North of Mt. Ayr
	Old Reservoir	½ mile North of Mt. Ayr
	Walnut Creek Marsh	5 miles Southwest of Mt. Ayr
Sac	Arrowhead Lake	South Side of Lake View
	Black Hawk Lake	East edge of Lake View
	Black Hawk Pits	1½ miles South of Lake View
Scott	Crow Creek	East edge of Mt. Joy
	West Park Lakes (4)	¼ mile West of Davenport

Shelby	Mantano Park Pond Prairie Rose	8 miles Northwest of Defiance 8 miles Southeast of Harlan
Story	Dakin's Lake Hendrickson Marsh Hickory Grove Lake McFarland Lake Peterson Pits	½ mile North of Zearing 3 miles Northeast of Collins 3 miles Southwest of Colo 4 miles Northeast of Ames 4 miles Northeast of Ames
Tama	Casey Lake Otter Creek Lake Union Grove Lake	7 miles North of Dysart 6 miles Northeast of Toledo 4 miles South of Gladbrook
Taylor	East Lake Lake of Three Fires West Lake Wilson Park Lake Windmill Lake	½ mile North of Lenox 3 miles Northeast of Bedford 1 mile North of Lenox 2½ miles Southeast of Lenox 3½ miles East of New Market
Union	Afton City Reservoir Green Valley Lake Summitt Lake Three Mile Creek Lake Twelve Mile Creek Lake	1 mile West of Afton 2½ miles Northwest of Creston West edge of Creston East of Creston 4 miles East of Creston
Van Buren	Indian Lake Lacey-Keosauqua Park Lake Lake Miss-Tug Fork W Lake Sugema Piper's Pond-Tug Fork E	1 mile Southwest of Farmington 1 mile Southwest of Keosauqua 5 miles Southwest of Keosauqua 3 miles Southwest of Keosauqua 5 miles Southwest of Keosauqua
Wapello	Arrowhead Lake Ottumwa Reservoir	3 miles Southeast of Ottumwa Ottumwa
Warren	Banner Pits Lake Ahquabi	4½ miles North of Indianola 5 miles Southwest of Indianola
Washington	Lake Darling	3 miles West of Brighton
Wayne	Bob White Lake Corydon Reservoir Humeston Reservoir Lineville Reservoir Medicine Creek Wildlife Area Complex Seymour Reservoir	1 mile West of Allerton West edge of Corydon 1 mile North of Humeston North edge of Lineville 6 miles East of Lineville ½ mile South of Seymour
Webster	Badger Lake	4½ miles North of Fort Dodge

Winnebago	Ambrosson Pits Lake Catherine Rice Lake	3½ miles North of Forest City 6 miles West of Forest City 1 mile South, 1 mile East of Lake Mills
Winneshiek	Lake Meyers	3 miles Southwest of Calmar
Woodbury	Bacon Creek Browns Lake Little Sioux Park Lake Snyder Bend Lake Southwood	East edge of Sioux City 2 miles West of Salix 2 miles South of Correctionville 1½ miles West of Salix ½ mile West, ½ mile South of Smithland
Worth	Kuennen's Pit Silver Lake	2 miles South, ½ mile East of Northwood 10 miles West, 3½ miles North of Northwood
Wright	Lake Cornelia Morse Lake Wall Lake	3½ miles North, 2 miles East of Clarion 3½ miles West of Belmond 10 miles Southeast of Clarion

TABLE 3
Annual Pounds of Nitrogen Per Space of Capacity

<u>Swine</u>	<u>Space</u>	<u>Liquid. Pit</u>	<u>Liquid. Lagoon</u>	<u>Solid Manure</u>
Nursery, 25 lb.	1 head	2	1	5
Grow-finish, 150 lb.	1 head	21	6	29
Gestation, 400 lb.	1 head	14	5	39
Sow & Litter, 450 lb.	1 crate	32	11	86
Farrow-nursery	Per sow in breeding herd	22	8	85
Farrow-finish	Per sow in breeding herd	150	44	172
 <u>Dairy, Confined</u>	 <u>Space</u>	 <u>Liquid. Pit</u>	 <u>Liquid. Lagoon</u>	 <u>Solid Manure</u>
Cows, 1200 & up lb.	1 head	129	59	239
Heifers, 900 lb.	1 head	97	44	179
Calves, 500 lb.	1 head	54	24	100
Veal calves, 250 lb.	1 head	27	12	50
Dairy herd	Per productive cow in herd	203	87	393
 <u>Beef, Confined</u>	 <u>Space</u>	 <u>Liquid. Pit</u>	 <u>Liquid. Lagoon</u>	 <u>Solid Manure</u>
Mature cows, 1000 lb.	1 head	105	23	147
Finishing, 900 lb.	1 head	95	19	132
Feeder calves, 500 lb.	1 head	53	11	73
 <u>Poultry</u>	 <u>Space</u>			 <u>Dry Manure</u>
Layer, cages	1000 head			816
Broiler, litter	1000 head			585
Turkeys, litter	1000 head			1400

TABLE 4
Crop Nitrogen Usage Rate Factors

Corn	Zone 1	0.9 lbs/bu	Orchard grass	38.0 lbs/ton
	Zone 2	1.1 lbs/bu	Tall fescue	38.0 lbs/ton
	Zone 3	1.2 lbs/bu	Switch grass	21.0 lbs/ton
Corn silage		7.5 lbs/ton	Vetch	56.0 lbs/ton
Soybeans		3.8 lbs/bu	Red clover	43.0 lbs/ton
Oats		0.75 lbs/bu	Perennial rye grass	24.0 lbs/ton
Alfalfa		50.0 lbs/ton	Timothy	25.0 lbs/ton
Wheat		1.3 lbs/bu	Wheat straw	13.0 lbs/ton
Smooth brome		40.0 lbs/ton	Oat straw	12.0 lbs/ton
Sorghum or Sudan grass		40.0 lbs/ton		

The following map outlines the three zones for the corn nitrogen usage rates indicated in the Table 4. Zone 1 corresponds to the Moody soil association. Zone 2 corresponds to the Marshall, Monona-Ida-Hamburg, and Galva-Primghar-Sac soil associations. Zone 3 corresponds to the remaining soil associations.

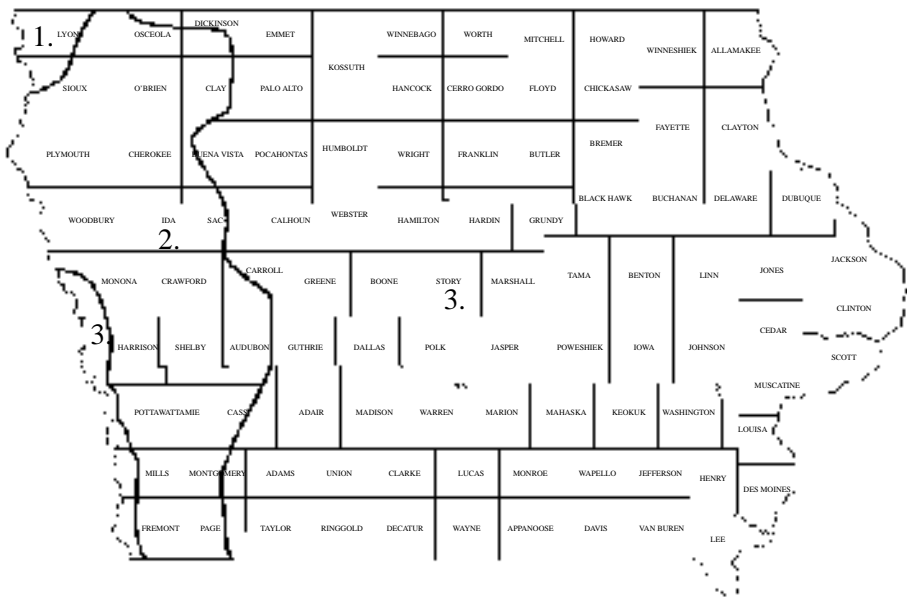


TABLE 5
Volume of Manure Produced Per Space of Capacity

<u>Swine</u>	<u>Space</u>	<u>Daily</u>		<u>Yearly</u>
		<u>Liquid. Pit</u>	<u>Liquid. Lagoon</u>	<u>Solid Manure</u>
Nursery, 25 lb.	1 head	0.2 gal	0.7 gal	0.34 tons
Grow-finish, 150 lb.	1 head	1.2 gal	4.1 gal	2.05 tons
Gestation, 400 lb.	1 head	1.6 gal	3.7 gal	2.77 tons
Sow & Litter, 450 lb.	1 crate	3.5 gal	7.5 gal	6.16 tons
Farrow-nursery	Per sow in breeding herd	2.2 gal	5.4 gal	6.09 tons
Farrow-finish	Per sow in breeding herd	9.4 gal	30 gal	12.25 tons
<u>Dairy. Confined</u>	<u>Space</u>	<u>Liquid. Pit</u>	<u>Liquid. Lagoon</u>	<u>Solid Manure</u>
Cows, 1200 & up lb.	1 head	11.8 gal	40.1 gal	19.93 tons
Heifers, 900 lb.	1 head	8.8 gal	29.9 gal	14.95 tons
Calves, 500 lb.	1 head	4.9 gal	16.5 gal	8.30 tons
Veal calves, 250 lb.	1 head	2.5 gal	8.2 gal	4.15 tons
Dairy herd	Per productive cow in herd	18.5 gal	59.8 gal	32.77 tons
<u>Beef. Confined</u>	<u>Space</u>	<u>Liquid. Pit</u>	<u>Liquid. Lagoon</u>	<u>Solid Manure</u>
Mature cows, 1000 lb.	1 head	7.2 gal	15.7 gal	12.23 tons
Finishing, 900 lb.	1 head	6.5 gal	13.1 gal	11.00 tons
Feeder calves, 500 lb.	1 head	3.6 gal	7.3 gal	6.11 tons
<u>Poultry</u>	<u>Space</u>	<u>Dry Manure</u>		
Layer, cages	1000 head	9.60 tons		
Broiler, litter	1000 head	9.00 tons		
Turkeys, litter	1000 head	35.00 tons		